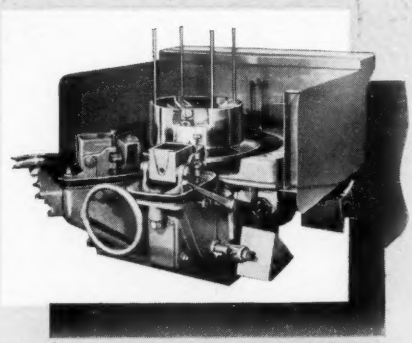
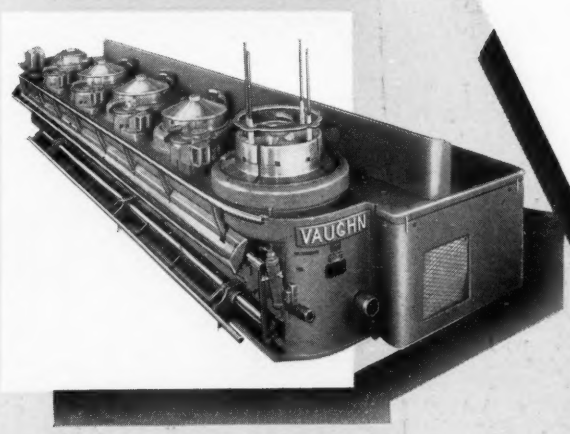
WIRE AND WIRE PRODUCTS

SEPTEMBER 1944

Vaughn

MOTOBLOC and MOTOBLOX



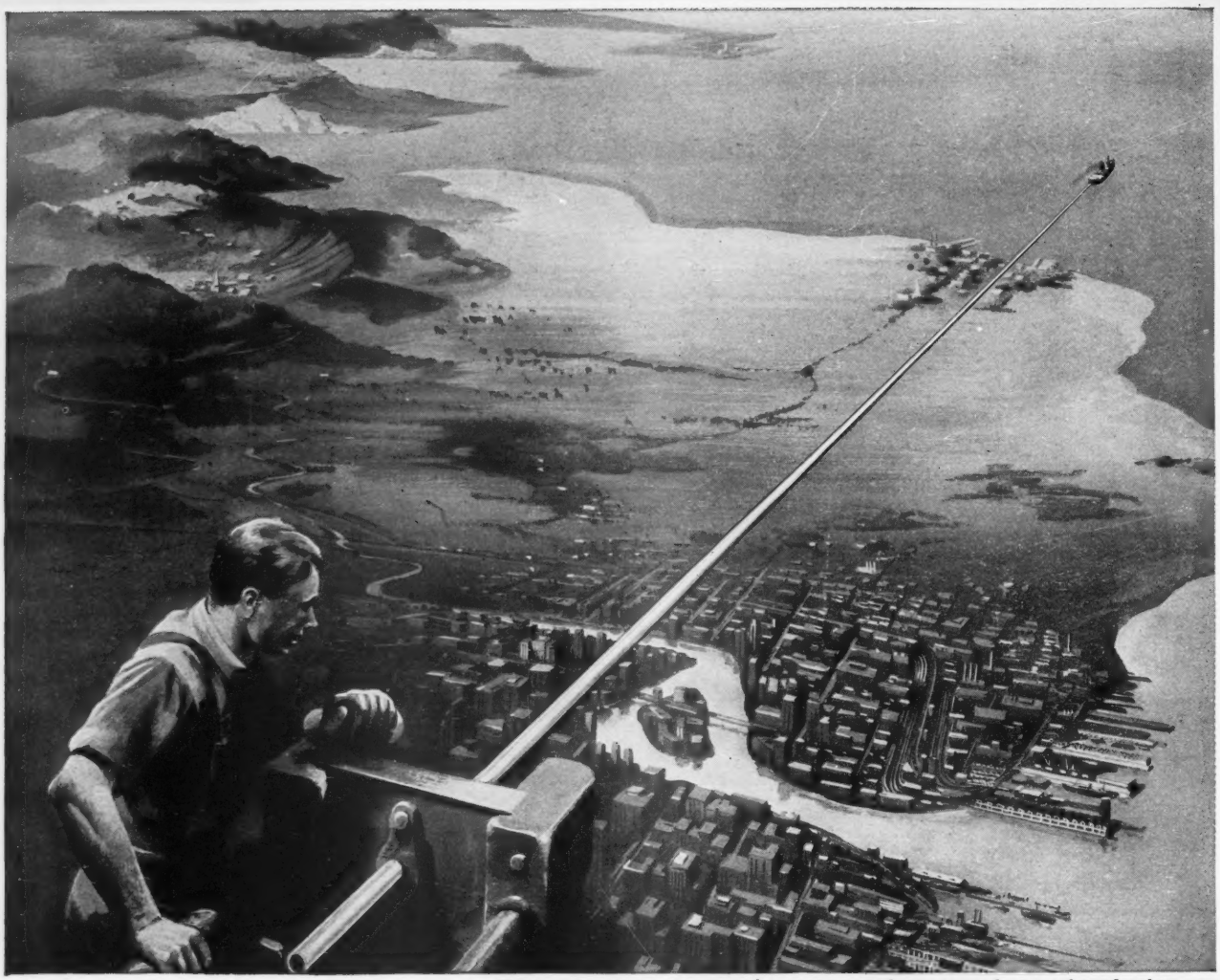


. . . Good SOLDIERS IN WAR
. . . . GOOD SERVANTS IN PEACE
. . Ready FOR YOUR
TOUGHEST JOBS
IN FUTURE MARKETS!

THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT
Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION



The American Brass Company, famous name in brass, in producing tubing for ship condensers overcame a difficult lubrication problem with a Shell Industrial Lubricant.

S-T-R-E-T-C-H-I-N-G BRASS

A SOLID, CAST, BRASS BILLET is perforated and stretched 25 times its original length and becomes a flawless length of seamless tubing for a ship's condenser. The condensers of a Victory ship often require as much as 16,000 pounds . . . over 7 miles of tubing!

With 19,238,626 dead weight tons of shipping delivered in 1943, you can readily visualize the vast quantities of tubing vitally needed for the condensers of new ships alone.

Shell contributes to The American Brass Company production by supplying the Industrial Lubricant that makes it possible to work brass into condenser tubing.

To take a 2-foot billet of tough, solid brass and transform it into 50 feet of thin-walled tube involves tremendous force and friction. Before each of the series of drawing operations, which are performed cold, tube blanks, or tubes, are dipped into Shelldraw Compound.

Shelldraw Compound not only prevents metal-to-metal contact, but because of its unique cooling properties eliminates excessive expansion of both die and tubing. Size tolerances are maintained, die wear is reduced, finish is superior. As war production sets new records, proper lubrication becomes even more vital. Yesterday's solution is seldom good enough for today.

Are you sure your plant has the benefit of all that is new in lubrication as it develops? Ask a Shell engineer.

SHELL

Leaders in War Production rely on

SHELL INDUSTRIAL LUBRICANTS

Carboloy Shape Die Service brings you quality dies, exclusive, Carboloy developed finishing and servicing equipment, specialized field service and a free factory-training course to help you handle carbide dies quickly and efficiently.

Carboloy Shape Dies are available to you in three ways: (1) Standard rough shape and hexagons available from stock in sizes 5/32" through 1⅝" (2) Large special shapes made to your exact specifications and (3) Small cored rounds for quick conversion—in your die room—to small special shapes.

To help you finish, service and use these dies efficiently, Carboloy Service covers complete recommendations and assistance in the installation and initial use of servicing equipment—a period of thorough instruction in our factory-training course in Detroit—and expert service on the job whenever required. Ask your Carboloy representative for full details.

CARBOLOY COMPANY INC

11171 E. 8 MILE BLVD., DETROIT 32, MICHIGAN

BIRMINGHAM • CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • MILWAUKEE
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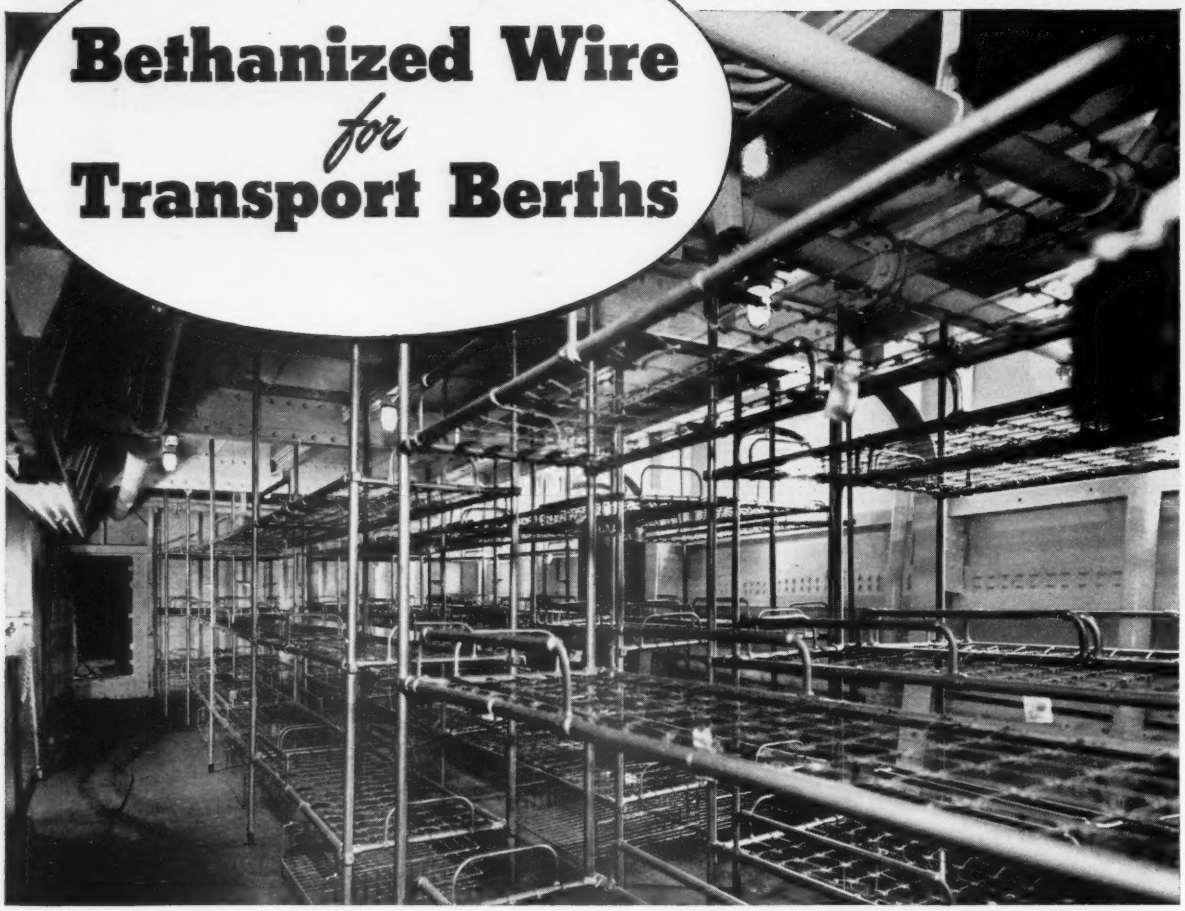
CARBOLOY TRADEMARK **SHAPE DIES**

Bethanized Wire *for* Transport Berths



You'd never recognize the interior of a cargo ship once it has been converted to a troop transport. For what before was a gaping hold has been subdivided by new decks and bulkheads, and the space filled with berths by the hundreds, arranged in tiers. Many of these berths are made of close-mesh link fabric, formed from bethanized wire.

Bethanized wire is used in forming link fabric for berths because: (1) The bethanized coating of 99.9+ per cent pure zinc is so ductile that it easily withstands the severe fabrication involved in weaving link fabric. (2) Because of the purity, uniformity and thickness of the coating, bethanized wire is highly resistant to corrosion.

The bethanized coating is applied by an electrolytic process which deposits a layer of zinc that is uniform in thickness both along and around the wire. The bond between the zinc and the steel base wire is so tight that the two metals practically become one. So ductile and adherent is the zinc coating that bethanized wire can be severely bent and twisted—even drawn to a fraction of its size—without the slightest damage to the coating.

Bethanized wire is being widely used today on the fighting fronts and on the production front. In the post-war years, bethanized wire may be expected to have even more numerous uses, many of them applications that had never before been considered possible for zinc-coated wire.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.
BETHLEHEM STEEL EXPORT CORPORATION, New York City

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

Science in Pickling

RODINE played a major part in bringing order out of chaos in the pickling of steel.

Twenty-five years ago the "pickle house" with its acid wet floor and its choking, corrosive fumes was a place avoided. Supervision was almost absent; acid consumptions and metal losses, now known to be high, were then looked upon as normal. Over-pickling of all types of products and the embrittlement and blistering of wire in this production bottleneck were looked upon as necessary evils.

With the coming of Rodine things changed. Rodine demonstrated it was no longer necessary for pickling acids to continue dissolving metal after the scale had been removed; that embrittlement could be reduced to the point of elimination; that brighter, better pickled surfaces could be obtained; that over-pickling could be prevented; that, with supervision, baths could be operated longer and that, with a minimum amount of acid discarded in the exhausted bath, still further acid savings could be made.

While Rodine showed all these savings were possible, it was Industry's role to make them, and Industry did. As a result, not only are pickling costs reduced to but a fraction of those of twenty-five years ago, *but it is now possible to schedule a large production of well-pickled material and get it.*

Rodine has kept ahead of changing conditions with improved product and new technique that still play a major role in solving many war-time problems.

ACP Pickle Bath Toner

Used with or without Rodine, ACP Pickle Bath Toner speeds and improves pickling.

Its use produces brighter, cleaner pickling, saves acid by reducing dragout through faster, more uniform draining of solution from pickled work.

ACP Pickle Bath Toner removes light films of oil and grease from the work, thereby permitting faster pickling on work coated with an oil film. It is also used in cool sulphuric acid baths to speed pickling where sufficient heat is not available.

ACP Laboratories, the chemists who develop the Rodine, and the technicians who have served the many pickling industries that use it are on call to assist in obtaining improved pickling at a minimum cost.

Manufacturers of Inhibitors & Metal Working Chemicals

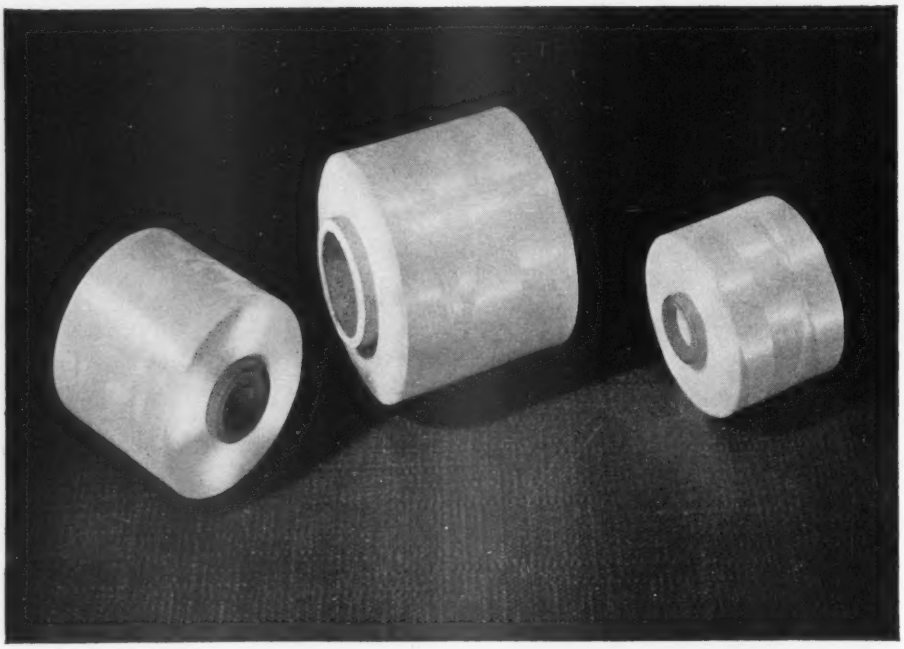
AMERICAN CHEMICAL PAINT CO.
AMBLER ACP **PENNA.**

Note: West Coast Plants may address inquiries and orders for prompt delivery to: Leon Finch, Ltd., 728 East 59th St., Los Angeles, Calif.

CHEMICALS ACP PROCESSES

American Chemical Paint Company, Ambler, Pa.
Please send me general Technical Service Data Sheets on
☐ Rodine ☐ Pickle Bath Toner

*Name*_____ *Title*_____
*Company*_____
*Address*_____
D-9



Behind these New Insulating Yarns...
The Know-How of a Famous Name

THE PRECISION-MADE WIRING of today demands precision-wound yarns—and Cheney Brothers meet this demand with superior nylon yarns. They have all the advantages of scientifically accurate put-up made to customers' specifications. Each tube is precision wound—with a minimum number of knots and maximum uniformity of tension—then individually wrapped and labeled.

These yarns are made with all the skill and careful workmanship which characterize the century-old Cheney tradition. And that tradition of unexcelled quality is just as vital a part of the present and future as of the past. Today's production, of course, is largely military; but Cheney Brothers are already planning for the period after the war. Then new and even more remarkable Cheney developments will be forthcoming—products and services especially designed for the future that all Americans are building now with their purchases of War Bonds.

★ CHENEY YARNS

CHENEY BROTHERS

Manufacturers of fabrics of exceptional quality since 1838

Velvets—Pile Fabrics—Upholstery and Decorative Textiles—Cravats
Men's Wear Fabrics—Yarns for Industry—Industrial Textiles

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MILLS AT MANCHESTER, CONN.

ALSO AT MANCHESTER, CONNECTICUT, A SUBSIDIARY...PIONEER PARACHUTE COMPANY

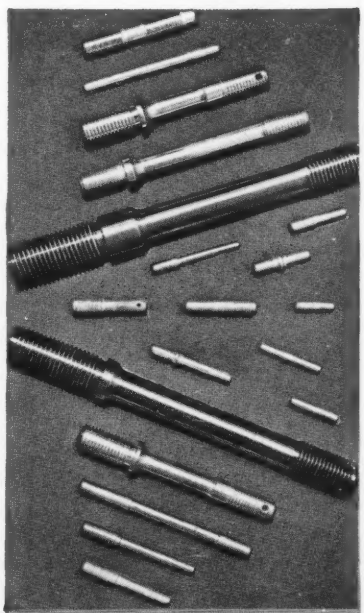
Pittsburgh Alloy Steel is used in Packard-Built Engines

IN the speedy Mustang that slashed cross-continent in a record breaking 6 hours, 31 minutes, *Pittsburgh Alloy Steel* went along for the ride. And when a Mosquito Bomber thundered Labrador to London in a time-clipping lunge, *Pittsburgh Alloy Steel* was ticking off the miles and minutes with it. For in the Packard-built Rolls-Royce engines that power these famous ships, precision parts made from Pittsburgh "aircraft quality" alloy bars, wire and tubing function vitally.

So what?

So *again* it has been clearly demonstrated that *open-hearth* alloy steel, as produced by Pittsburgh Steel Company, has achieved perfection that meets specifications for the toughest alloy steel applications. Only the *best* in steel is good enough to fly!

When your requirements for alloy grades combine the problems of manufacturing economy, *Pittsburgh* Alloy Steel, made by the Open-Hearth Process, can often fill the need exactly. Send us your specifications for analysis, recommendations and pricing.

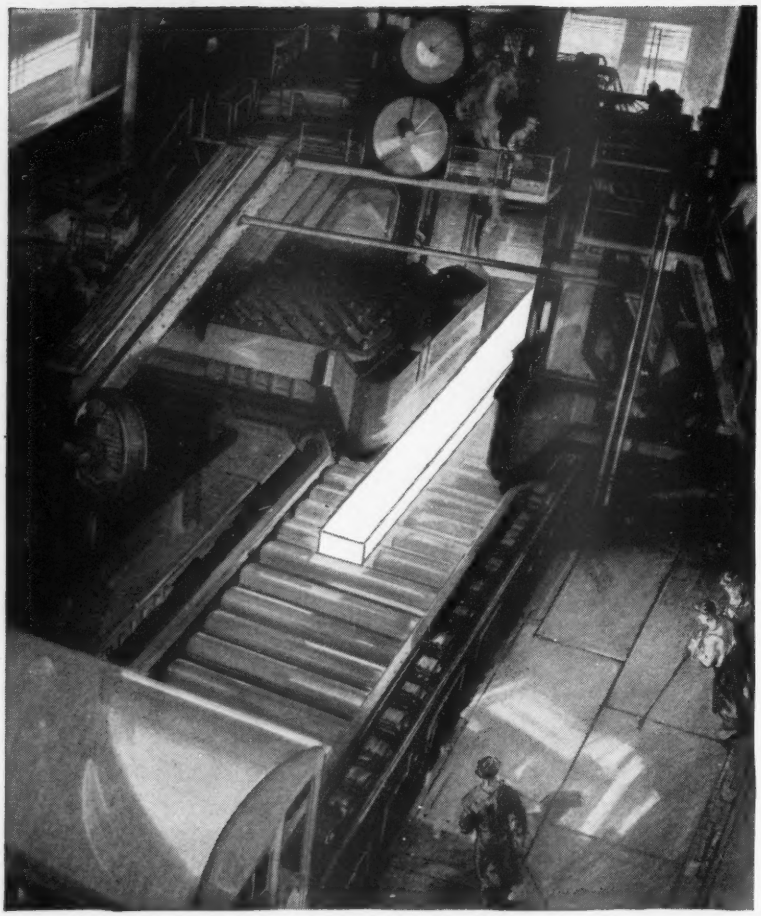


The typical stud parts shown above are used in Packard Rolls-Royce engines and are machined from cold drawn, triple-alloy steel bar stock furnished by PITTSBURGH STEEL COMPANY.

PITTSBURGH STEEL COMPANY
1641 GRANT BUILDING, PITTSBURGH, PA.

PITTSBURGH ALLOY STEEL

BILLETS, BARS, WIRE, TUBING: ALSO CARBON AND STAINLESS STEEL



STEEL'S GIANT GATEWAYS

Virtually all the steel this country produces — now more than 90,000,000 tons a year—must pass through the giant gateways of America's blooming mills. For here begins the shaping of steel into useful form, as mighty steel ingots, brought to uniform white heat in the soaking pits, are skilfully rolled into long blooms and wide slabs.

The operation and maintenance of blooming mills at the highest peak of efficiency and production ever known contribute vitally to the output of war steel in this critical period.

Skill and speed in teamwork, with quality control in command, keep our fighting men armed with superior weapons and assure better steels in abundance when the world returns to peaceful work.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH, PENNSYLVANIA
J&L STEEL

CONTROLLED QUALITY STEEL FOR WAR

BLOOMS

Bloma was Anglo-Saxon for a small mass of malleable iron from which the dross or slag was beaten out with hammers in the hands of dawn-of-civilization workmen. This primitive method of making "blooms" was pushed aside by progress centuries ago. But the word for the product survives to give a name to the heavy blooms rolled from steel ingots on today's giant modern blooming mills.

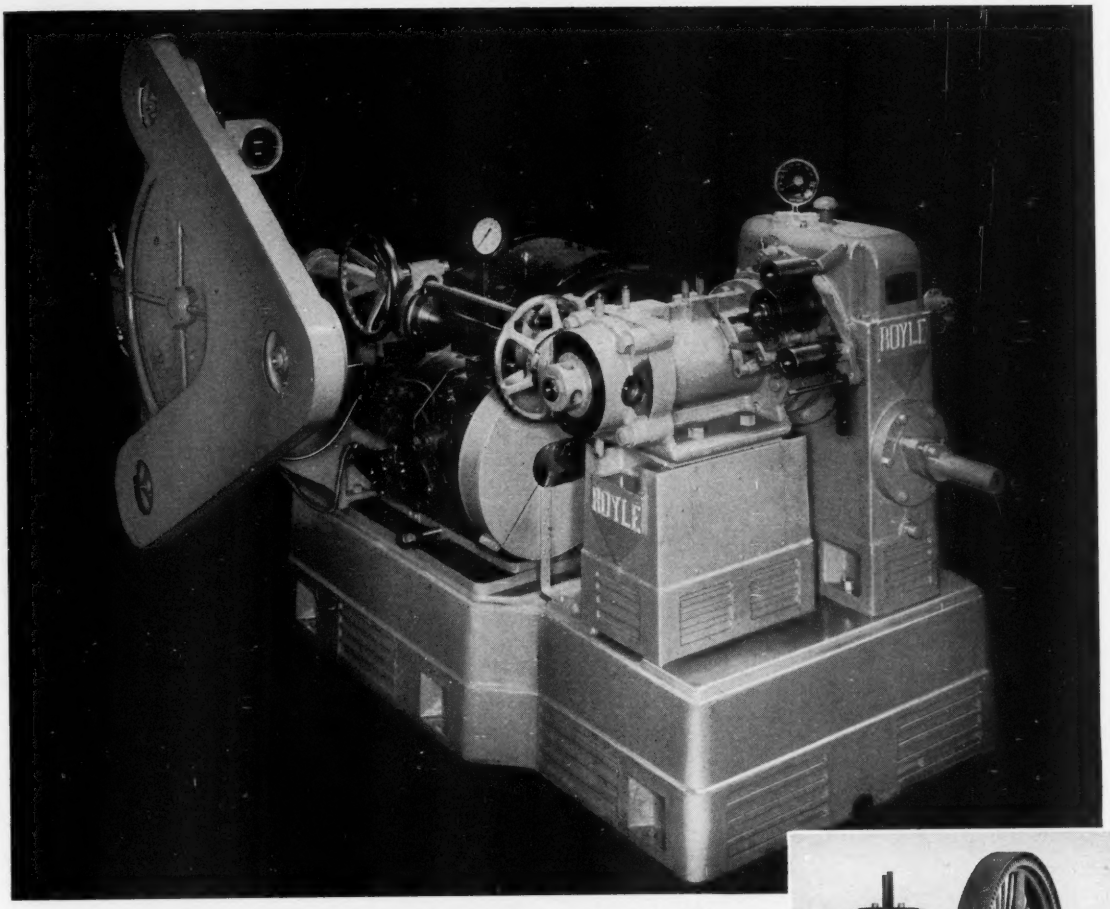
Locomotive drove first reversing mill that became a blooming mill. In early mills the rolls moved in one direction only. An Englishman, John Ramsbottom, in the 1860's, manager of an iron works and a railroad, too, conceived the idea of a mill that could be reversed for repeated rollings back and forth. He coupled a railroad locomotive to one of his rolling mills and introduced the reversing mill to the iron and steel industry. This type mill evolved into today's great, powerful blooming mills, gateways for the vast tonnages of steel that made invasion possible.

2 World records made on J&L mill. The rolling of 171,440 tons of ingots on the blooming mill of the Aliquippa (Pa.) Works of the Jones & Laughlin Steel Corporation during the month of March 1943 established a world's record in production of steel for war. During the establishment of this monthly world record, one of the three crews of the mill set up a world record for an 8-hour turn by rolling 512 ingots. This is at the rate of more than an ingot a minute.

Roller, manipulator, engineer constitute the operating crew of a modern blooming mill. They control the mill and the ingot from the "pulpit," a small room high above the floor of the three-story mill. Several hundred other workmen round out the rolling team that works together in close timing and coordination to obtain record production while rigidly maintaining high quality.

Army-Navy "E" was awarded Otis Works, Cleveland, of Jones & Laughlin Steel Corporation on July 24, 1944 with patriotic ceremonies. In his letter to the 5,000 employes, Robert P. Patterson, Under Secretary of War, said: "Your record will be difficult to surpass; yet the Army and Navy have every confidence that it was made only to be broken." Replying for the employes, H. E. Lewis, President of J&L said in part: "This recognition by our Army and Navy of a job well done will serve to inspire all of us to strive for even greater production in the critical days now upon us and yet to come." This is the third J&L plant to receive the award, the Aliquippa and Pittsburgh Works having been so honored previously.

First iron rails used by railroads in this country were imported from England in 1831, were 18 feet in length and light in weight. Standard steel rails today are 39 feet in length and weigh as much as 152 lbs. per yard.



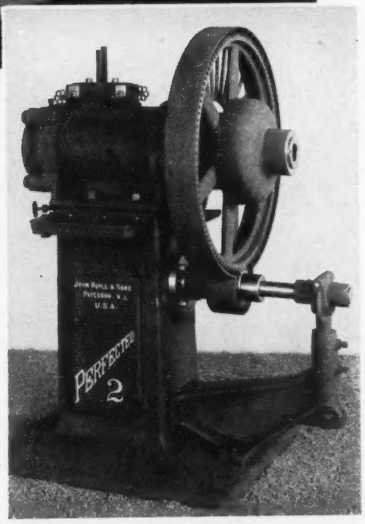
No. 2 Royle Continuous Vulcanizing Machine equipped with Stock Screw Speed Tachometer and Sperry Exactor Control.

Extruding in 1944 with a 1905 Royle Tubing Machine

Yes, it is being done. Not in one isolated plant but in many where ingenuity has been substituted for modern machines. These processors have done a grand job in literally interpreting "make it do".

Essentially the continuous extrusion process hasn't changed a great deal since John Royle & Sons first introduced it sixty-four years ago. There have been refinements—the most apparent being in the field of temperature control and in the development of accessory equipment.

When the war has been won these "turn of the century" tubers will be retired for modern machines. The post-war Royle Extruder probably won't be a startling revelation. Into it will go all of the "know how" gained from pioneering in the continuous extrusion machinery field since 1880.



No. 2 Royle Tubing Machine of 1905

JOHN ROYLE & SONS

ROYLE PATERSON N. J.

PIONEER BUILDERS OF EXTRUSION MACHINES SINCE 1880

Continental Europe
James Day (Machinery) Ltd.
London, England

Home Office
B. H. Davis J. W. VanRiper
SHerwood 2-8262

Akron, Ohio
J. C. Clinefelter
UNiversity 3726

PATERSON 3, NEW JERSEY

WICK and SPEN
turn Questions into Exclamations

Many manufacturers bring their difficult wire questions to experts Wick and Spen. And after their problems have been straightened out we find we've made new friends.

The knack of handling wire isn't something we've acquired overnight. Our reputation has been 123 years in the making—and we're still developing new techniques—working out new types of wire for new uses.

Part of our success lies in the thorough study which our metallurgical engineers make of the service requirements of the wire for your product . . . part in the fact that every step in manufacture—from ore to finished product—is taken in our own open hearths and modern wire mills. Together these factors are your assurance of getting the type of wire that is best for the purpose intended.

We can meet your needs for high or low carbon steel wire; round, flat or shaped, in a variety of sizes, tempers, grades and finishes. Let us have your specifications.

A NEW SUBSIDIARY

The Wickwire Spencer Steel Company announces the purchase of the Sirian Wire & Contact Co. of Newark, N. J. and the formation of a new subsidiary—The Wickwire Spencer Metallurgical Corporation. Fine drawn tungsten and molybdenum wire and rods, as well as tungsten carbide dies and tools, will continue to be manufactured.

Send your wire questions to

WICKWIRE SPENCER STEEL COMPANY

500 FIFTH AVENUE, NEW YORK (18), N. Y.

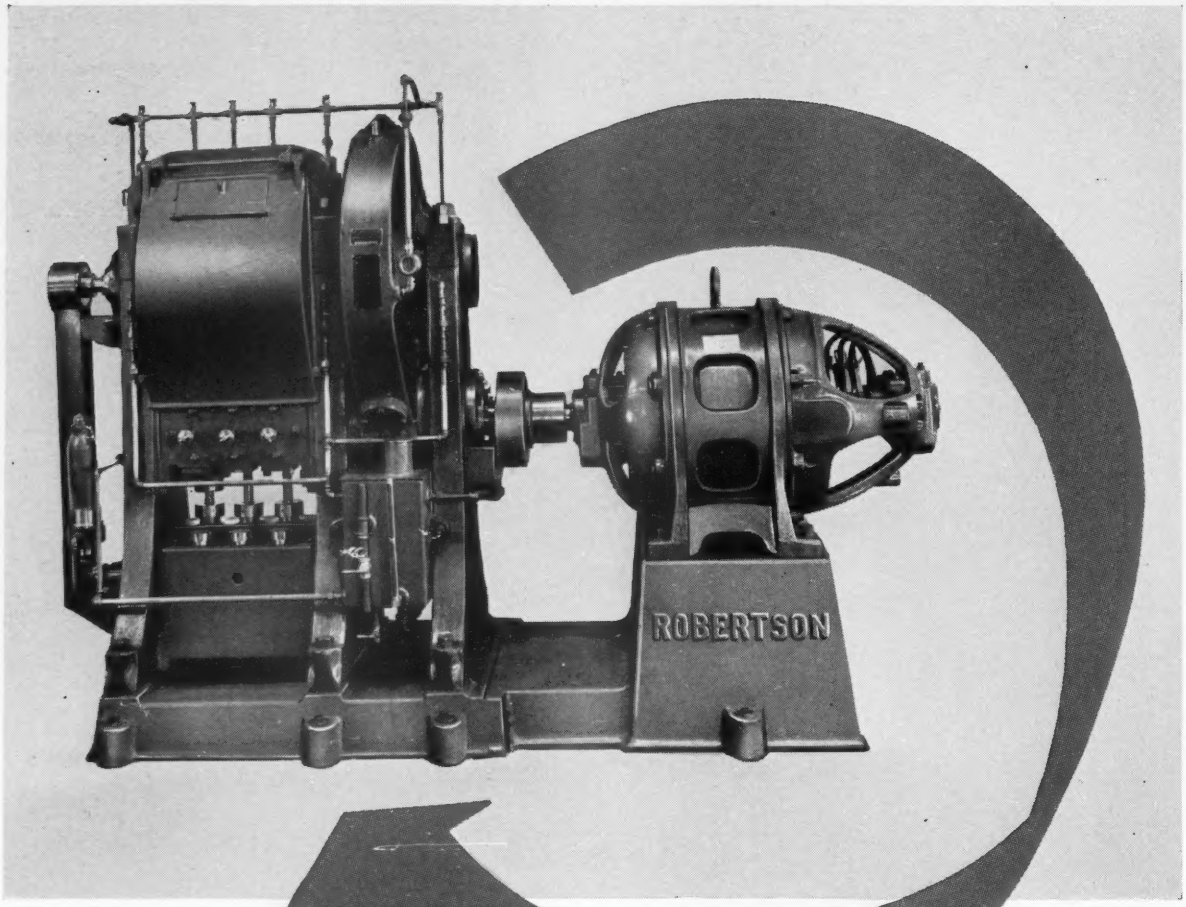
Abilene • Buffalo • Chattanooga • Chicago • Detroit • Houston • Los Angeles • Philadelphia • San Francisco • Tulsa • Worcester

FOR EXTRA BRIGHT FINISH

NUMBER 33 is designed to secure *extra bright finish* on one or two draft for use on wire to be coated for arc weld, spot and butt welding, for painting, enamelling, galvanizing and tinning. It is used with light lime wash on one hole, and 2% to 3% on two holes.

NUMBER 33 is put into the lubricant-box as shipped and after drawing approximately half a bundle, will set up its own rolling motion. As it picks up lime from the rod, water should be added to give it its original viscosity and consistency. With fresh additions of new material, it will run continuously. Quantities for test furnished free of charge.

STANDARD INDUSTRIAL COMPOUNDS CO.
4600 W. Ferdinand St. • Chicago 44, Ill.



It's nothing new

. . . no, it's nothing new that Robertson introduces another *improvement! An excellent machine gains new productivity with a change that has taken time to develop. For over 86 years John Robertson, Inc. has striven to offer its clients all kinds of efficient Hydraulic Equipment.

Robertson machinery has long done an exceptional job by increasing Production output—Reducing cost and Improving efficiency in the plants of many of America's leading manufacturers of Rubber Hose and Cable.

*The new number 50 with eccentrics closed in and with the lubrication pump drive accomplished through bevel gears and shafting instead of through a chain. This arrangement makes it possible to have the circulating pump for the oil at the oil tank level so there is never any need for priming the lubrication pump. These new features will also be used in the numbers 60, 70, 80, and 90 pumps.

JOHN Robertson

125-135 WATER STREET, BROOKLYN 1, NEW YORK
Designers and Builders of all Types of Lead Encasing Machinery
Since 1858

Wire For Wire Rope

WIRE for wire rope keeps these Youngstown wire mills busy, day and night. In fact, America's wire rope needs are far greater than its capacity to produce. Wire rope by the millions of feet goes to tether barrage ballons, to lash cargo to ships, to equip every tank, truck and jeep with cable for binding on loads, for rescue work, etc.

Drawing wire for wire rope is a major activity at Youngstown, now as in peacetime, and manufacturing output is geared to the maximum of our ability to produce, yet quality supersedes volume with manufacturing standards maintained at the most exacting levels. Ready now to talk to you about your wire needs, present and future, we are equipped to meet your requirements, whether they call for standard or special specifications on chemical and metallurgical characteristics and physical tolerances.

Pipe and Tubular Products - Sheets - Plates - Conduit - Bars - Electrolytic Tin Plate - Coke Tin Plate - Rods - Wire - Nails - Tie Plates and Spikes - Alloy and Yoloy Steels.

QUALITY TRADE MARK YOUNGSTOWN SERVICE

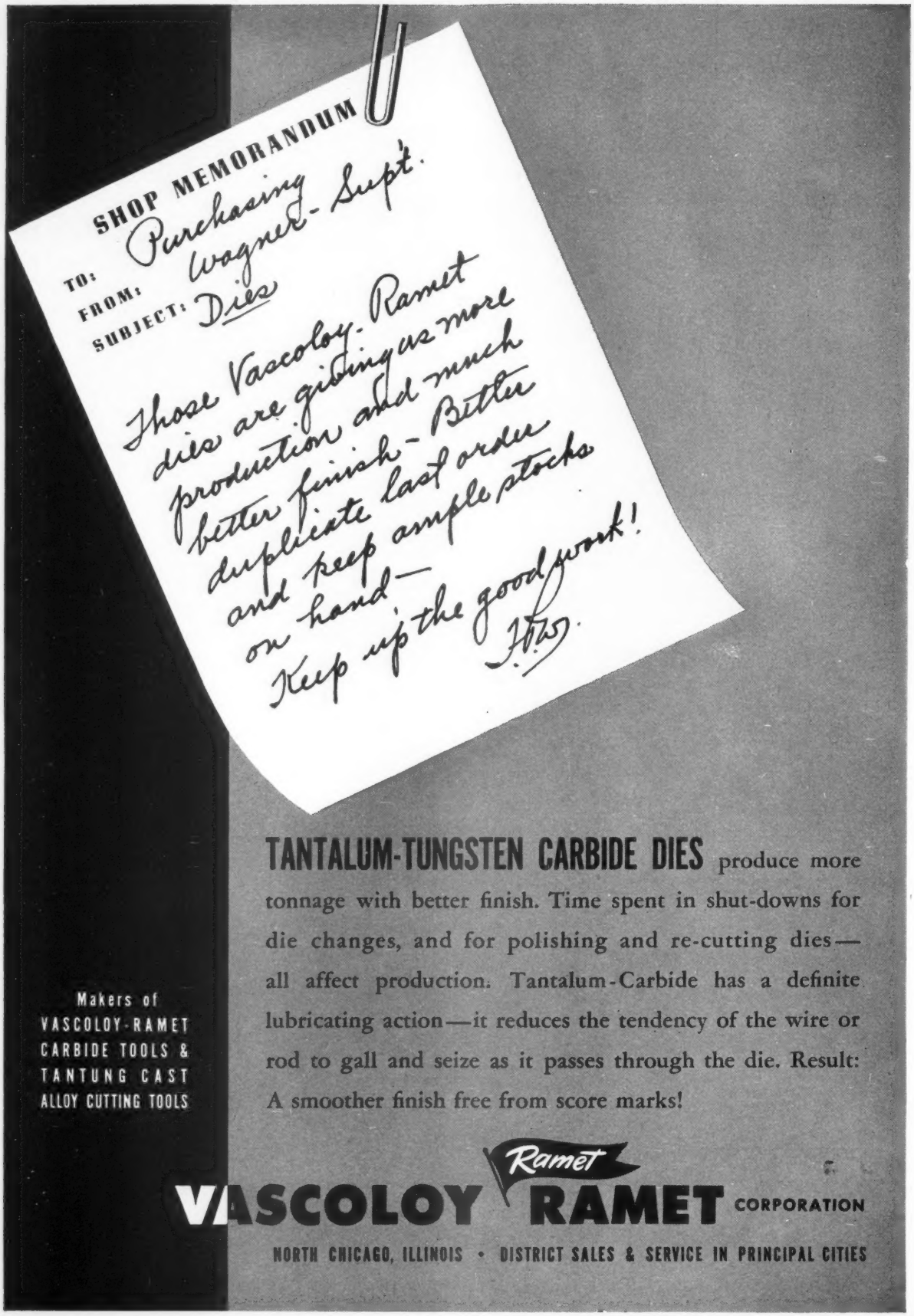
YOUNGSTOWN

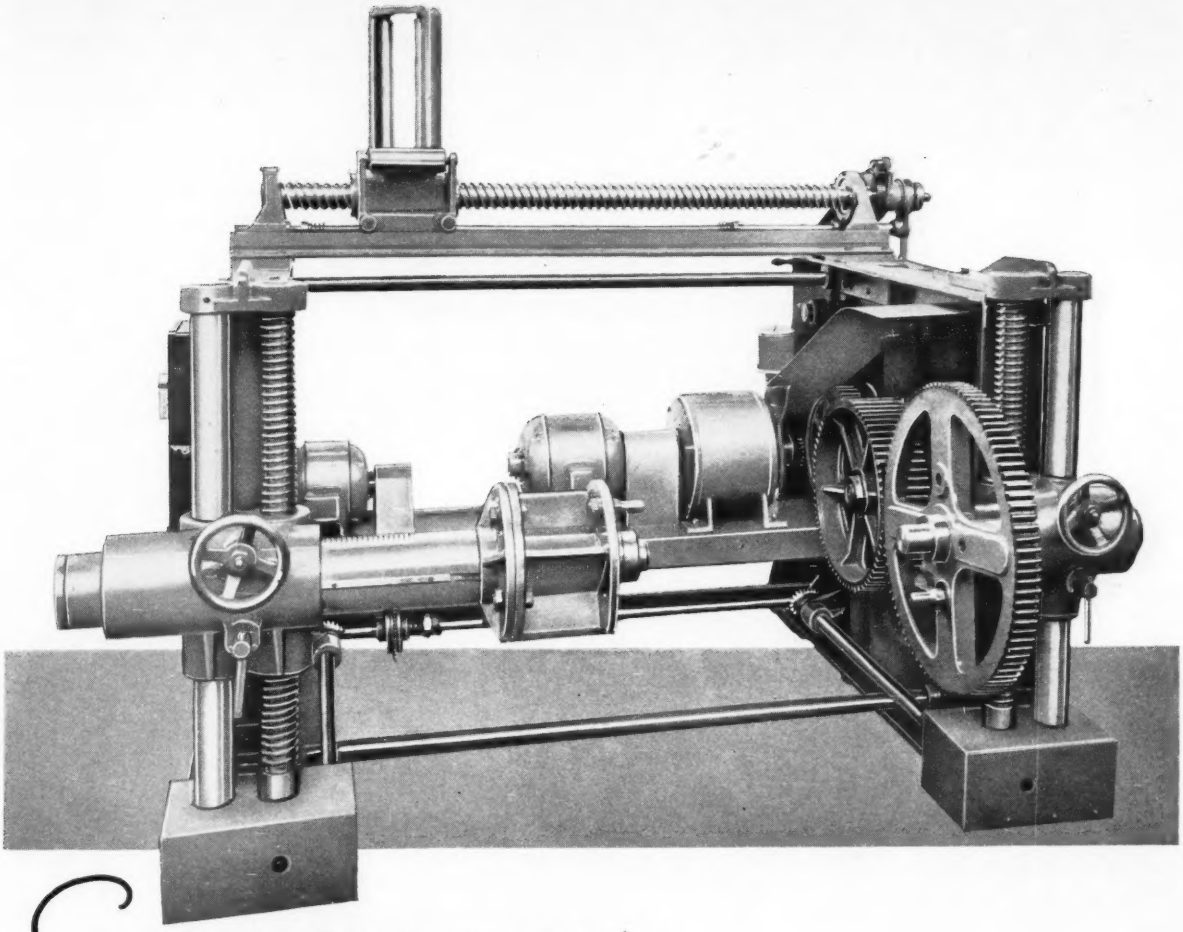
THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS


SHOP MEMORANDUM
TO: Purchasing
FROM: Wagner - Supt.
SUBJECT: Dies
Those Vascoloy-Ramet dies are giving us more production and much better finish - Better duplicate last order and keep ample stocks on hand—
Keep up the good work!
J.W.S.
TANTALUM-TUNGSTEN CARBIDE DIES produce more tonnage with better finish. Time spent in shut-downs for die changes, and for polishing and re-cutting dies—all affect production. Tantalum-Carbide has a definite lubricating action—it reduces the tendency of the wire or rod to gall and seize as it passes through the die. Result: A smoother finish free from score marks!
Makers of VASCOLOY-RAMET CARBIDE TOOLS & TANTUNG CAST ALLOY CUTTING TOOLS
Ramet
VASCOLOY RAMET CORPORATION
NORTH CHICAGO, ILLINOIS • DISTRICT SALES & SERVICE IN PRINCIPAL CITIES



Syncro scores again...

WITH A HIGHLY EFFICIENT CABLE TAKE-UP

The motor driven arbor centers of the new Syncro Cable Take-Up are adjustable within reasonable limits and the driving gears are constantly in mesh, so the arbor centers can be raised or lowered to suit the reel diameter while the Take-Up is operating.

The improved traverse mechanism provides adjustable stroke and pitch to accommodate different cable diameters. The stroke and pitch can easily be changed while the unit is operating.

A specially designed magnetic slip clutch drive maintains uniform cable tension during the entire spooling of cable on standard capacity reels and the cable tension can be adjusted while the unit is operating. Furthermore, there is no wear on the magnetic slip clutch and no slip rings or moving electrical connections are required.

Write for complete details.

SYNCRO MACHINE COMPANY

113 SOUTH JEFFERSON STREET
CHICAGO 6, ILL.

REPRESENTED IN CANADA BY
CANADIAN ELEVATOR EQUIPMENT CO.
TORONTO

EXECUTIVE OFFICES AND GENERAL WORKS – 611 SAYRE AVENUE, PERTH AMBOY, N. J.

Machinery for the Wire Industry

SYNCRO

WIRE and WIRE PRODUCTS

for October is the big ANNUAL CONVENTION NUMBER, containing pre-prints of papers for the technical sessions of the Wire Association.

The Directors of the Wire Association this year decided upon a program devoted to mill operating problems arising from war production, to help the industry further to increase the output of war materials.

The Convention will be an opportunity for mill men to exchange ideas and experiences — get the answers to those elusive questions that each one of us has. Indications are that it will be an important meeting and through it every effort will be made to speed the day of Victory.

Plan to be there yourself. Back up the work of the Association, buck up your employees, bolster the Industry's morale with appropriate advertising. Keep your Company's name to the fore by advertising in

WIRE
AND WIRE PRODUCTS

THERE IS PLENTY TO "SELL"

Good advertising is more than the immediate selling of machines and supplies. The history of advertising in the U. S. shows it has been the major force behind our progress, high standards of living and the good-will industry has established for itself. Advertising has made possible the development of America's unique and valuable technical press. Without advertising, democracy would be impossible—the cost of disseminating publishing services would be prohibitive. Advertising is the life-blood of American industry and one of the indispensables to Victory.

Let's all pull together to make this the best Convention and the finest Convention Issue of all time. Every man in the Wire Industry needs your co-operation and interest. Can we count on you?

✦ ✦ ✦

Forms close on September 20th. We would appreciate your sending your order for space now — and follow with copy and cuts as soon thereafter as possible. It will help us to serve you.

WIRE & WIRE PRODUCTS

300 Main Street

STAMFORD, CONN.

Official Publication of The Wire Association

POLYETHYLENE

A "Carbide Chemicals" Production Achievement for the Navy

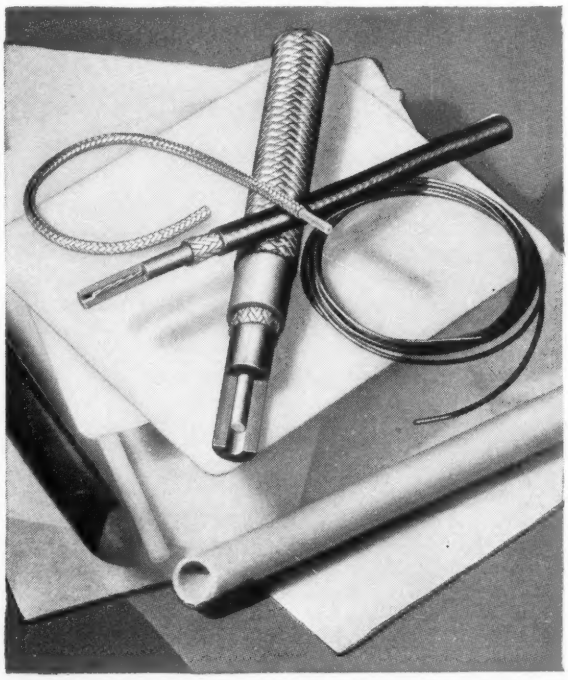
Important New Plastic Has Many Unusual Properties

A little over two years ago, the U. S. Navy learned that Carbide and Carbon Chemicals Corporation in collaboration with an associate company, The Linde Air Products Company, had developed a high pressure synthesis of a new material, Polyethylene, and it was found that this material was exactly suited to meet the Navy's requirements of an insulation for coaxial cable used in radar equipment.

At the Navy's request, these two companies, working together but entirely independent of anyone else, designed in their own Engineering Department and built with their own Construction Organization a plant to produce polyethylene by a process different from any other commercial polyethylene process.

Within thirteen months from the date the project was authorized, this plant was producing at 180 per cent of rated capacity.

At the conclusion of the first full year of production the Navy Department told the plant:



"One year ago your plant commenced the production of polyethylene, a component of radio cable essential to the efficiency of electronic communications units and, therefore, vital to the success of naval operations. Production for the year has equalled 240 per cent of the rated output for the facilities. Everyone engaged in developing the product, planning, engineering, and managing the plant, and each of you engaged in producing polyethylene may be justly proud of a valuable contribution to the war effort."

Today, approximately two years after Carbide was given the assignment, this plant is producing polyethylene at 600 per cent of rated capacity and is providing the Navy's requirements of this material for use in coaxial cable.

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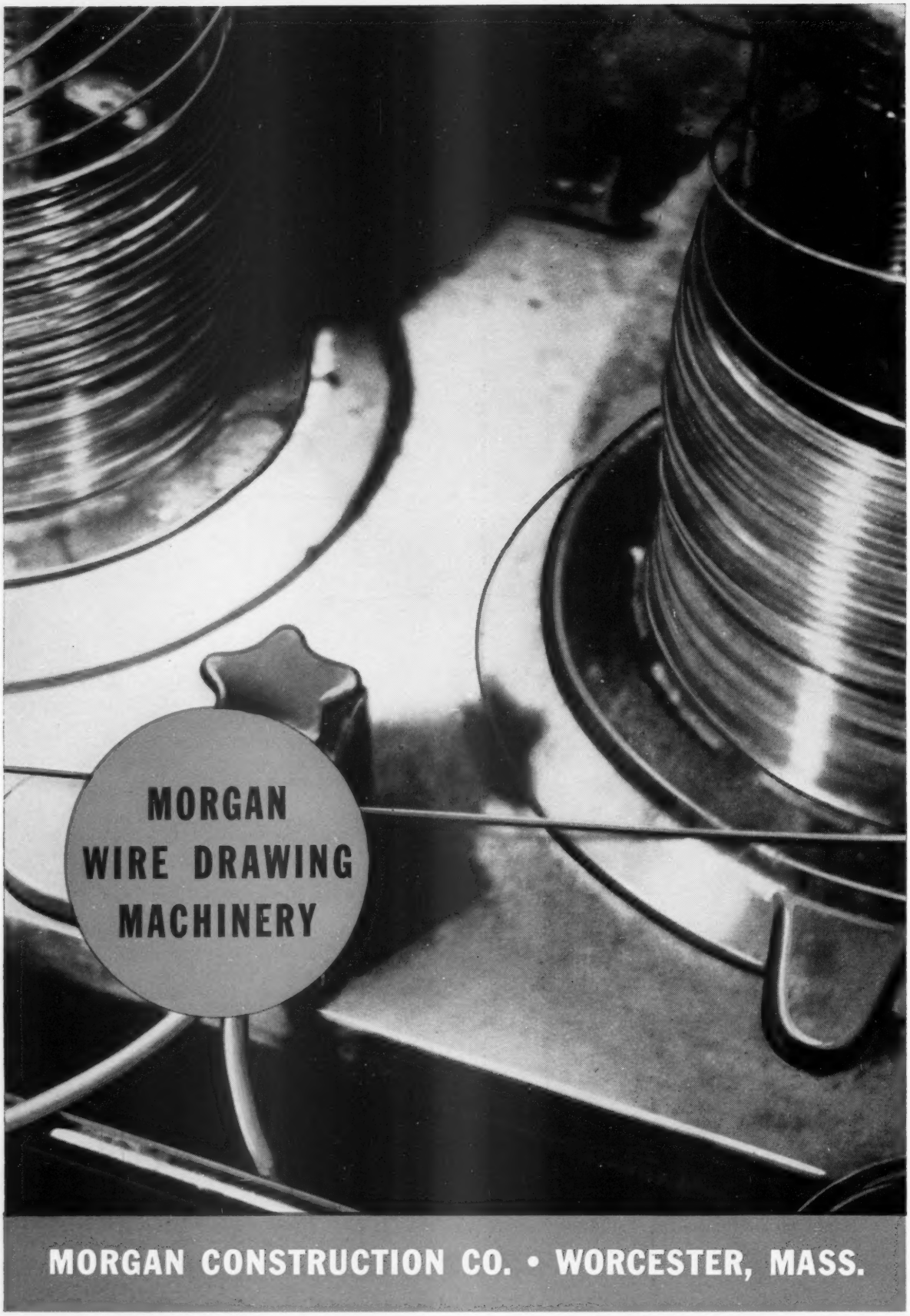
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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 19 SEPTEMBER, 1944 No. 9

Designated as

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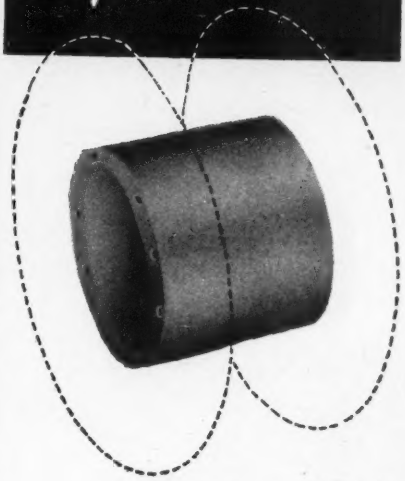

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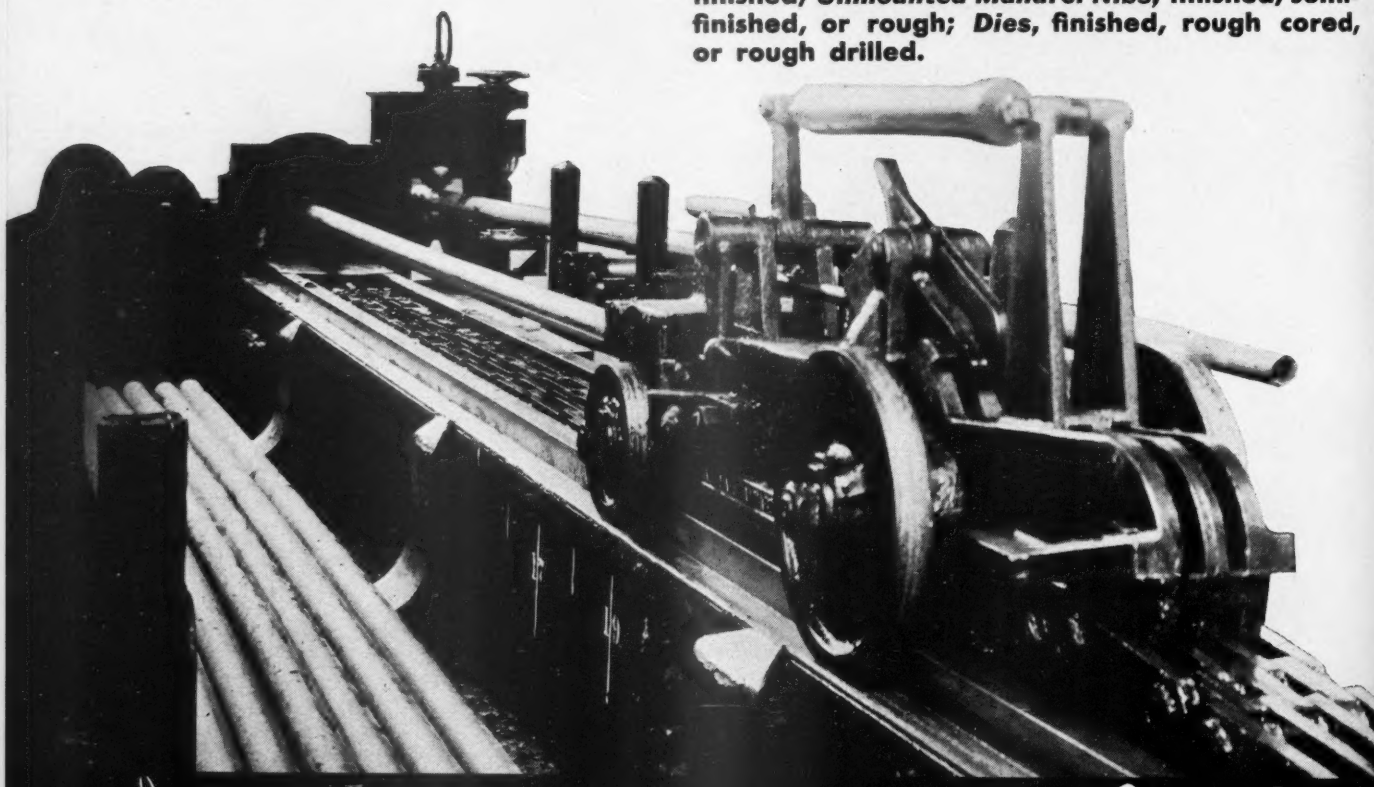

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 19 SEPTEMBER, 1944 No. 9

History and Growth of the Tungsten Carbide Die

By A. R. Zapp,
Manager, Firthaloy Div., Firth-Sterling Steel Co., McKeesport, Pa.

EDITOR'S NOTE

The author of this article has been identified with the Tungsten Carbide Die Industry since its introduction in the United States from Germany 16 years ago. The data presented herewith is an interesting contribution to the history of the development and perfecting of these dies and was presented at the Los Angeles, Cal., Regional Meeting of the Wire Association, June, 1944. ✦ ✦

AFTER reading the various articles which have appeared in recent periodicals by **Ken Lewis, Flint Elder** and many other leaders who have contributed a great deal of research and technical data and theories relating to tungsten carbide dies, I have decided to speak about the high spots in the history and growth of tungsten carbide, in order to tie it in with these technical theses, and try to give a history of the development of these dies which forms the foundation on which many of these theories were based.

✦ ✦ ✦

Three Classes of Industries

ALL of us have been impressed with the statements by financial papers that industries in general fall into three classes, namely: (1) the **Growth Industries,** which, either because of their newness or the adaptability or availability of their products, are expected to enjoy a tremendous boom or growth after the war; (2) the **Stabilized Industries** whose growth after the war will parallel the growth of the population and whose future is dependent on fixed markets: (3) the **Receding Industries** — those which are either receding now, or which have definitely reached their climax, or which (due to changed conditions) will either have to alter the character of the goods they manufacture or pass out of the picture.

A. R. ZAPP
Manager, Firthaloy Division
Firth-Sterling Steel Company,
McKeesport, Penna.

✦ ✦ ✦

Sintered-Carbide Dies

IN thinking of these classifications, I do not feel that they take into account the initiative, progress and improvements which would continue to make a stable industry, such as the wire industry, grow constantly. In looking back over the past 16 years during which I have been associated with that industry, I am very much impressed with the growth which both the wire and carbide in-

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dustries have made and feel that they will continue to grow as they are so intimately interwoven, one with the other.

✦ ✦ ✦

WHEN tungsten-carbide dies were first imported into the United States, their cost was very high. In fact, the first set was quoted at $1,200. At that time, about the only use to which tungsten-carbide was put — and about the only use that was visualized for it — was the drawing of wire.

✦ ✦ ✦

THE initial application of tungsten carbide came about because of the fact that, during the last World War, the shortage of diamonds for dies was so acute in Germany that the wire manufacturers began looking for a substitute, and turned to the then practically unused and little-known material called tungsten carbide. These foreign manufacturers, after considerable research by eminent physicists, produced a tungsten-carbide material for drawing wire, a material which provided a very acceptable substitute for the then practically non-existent diamonds.

✦ ✦ ✦

THIS first material which marked the commercial beginning of tungsten carbide was manufactured by the **Krupp Company** and given the name of **WIDIA**, the German translation of which was "hard as a diamond."

✦ ✦ ✦

Early Use in America

TUNGSTEN-carbide was first introduced commercially for wire-drawing purposes into the United States by **Mr. Morris Simons** of New York who, as a prominent diamond-die manufacturer, sought a material to complement his diamond dies which were of necessity confined (due to price and other economic factors) to the smaller sizes of both ferrous and non-ferrous wire. Several types of steel dies made from special alloys were tried at this time, but the production obtained therefrom was not sufficient to warrant the exploitation in a commercial field. The first hard material imported in 1925 was known as Wolfram. This was a cast carbide brought over from Germany. The tests on this material were not successful because the metal had considerable porosity due to inherent MFG difficulties. More than fifty dies were made, and not one had a perfectly smooth surface after the hole was drilled and polished. This metal was hard, and the few pieces that were usable, however, gave long wear. But, because of the porosity, it was not commercially feasible.

✦ ✦ ✦

ABOUT this time a new material made its appearance which, without sacrificing hardness, apparently did not contain objectionable features of Wolfram. Several sets of dies made from this material were brought to the United States and placed in a copper mill for trial where they came to the attention of **Mr. Morris Simon** who states as follows:

"In 1927 I accidentally learned of a metal that attracted my attention. A set of dies, made to run copper wire from ⅜" down to .080" was presented to a copper and brass company in Connecticut for trial. I was shown these dies and told that they would not draw a wire. Upon careful examination I found the metal was good. The surface of the die perfectly solid and homogeneous with no blow-holes visible, but the shapes were wrong, and that was the reason for the failure of the dies to draw. With the permission of the company, I reshaped and repolished the dies. They were put on the machine and ran perfectly. We observed these dies in continuous operation drawing wire, for a period of three days, and found that the size had not altered .0001". The management of the company and I were stunned. Unfortunately we did not know the source of the material as the agent who had left the dies had refused to reveal their origin. I surmised this to be a German product, and the next boat found me a passenger en route to Germany. There I learned that the material had been developed by Osram Company of Germany. I contacted Mr. Lowenherz, metallurgist of Osram, whom I knew well. Upon discussing it with him and Dr. Blau, the manager of Osram, I was informed that Osram had turned the material over for development to the Krupp Company of Essen. I immediately went to Essen. Oddly enough, Prof. Strauss and Herr Preussing, directors of the Krupp Company, seemed to know of me and my developments in the diamond-die field. I found them in a very receptive mood, and they were quite willing to give me the material known as WIDIA for development in the United States."

✦ ✦ ✦

IN April, 1928, the first sets of these dies were put into operation. The results were astonishing. The wire produced was round, and held to a tolerance of .0002 and .0003.

✦ ✦ ✦

THESE dies were installed on a rod machine which finished at .080 and about 40,000 pounds of on-size wire was obtained from the set whereas the dies previously used only drew 220 pounds of wire with a high percentage of scrap. These remarkable results immediately led to further experimentation with shape, speed and lubricants, which resulted in an increase in the production to 125,000 to 150,000 pounds of perfect wire at the finished size.

✦ ✦ ✦

THE results of these tests, astounding as they were, revolutionized the drawing of copper wire. Instead of drawing at 900 to 1000 fpm, we soon attained a speed of 3000 fpm. This increase of speed entailed changing both the power and speed of the rod machine. Another important development at this time was the discovery that much time was consumed restringing the dies after each bundle was drawn. In order to eliminate this down time and to obtain continuous operation, work was begun on brazing the end of one bundle to the beginning of the other. This was the forerunner of our present practice of welding bundles together.

✦ ✦ ✦

THE results of these improvements were immediately apparent because the production was increased to about 20,000 pounds of wire for an 8-hour shift, while production previously — when using the chilled-iron die — was only about 6,500 pounds for the same period.

✦ ✦ ✦

IT was also found that the wire produced was absolutely round, and on size, with a mirror-like

finish, as compared to the dull, scratched surface produced in a chilled-iron die. Also, the superior quality of the wire coming from the rod machines allowed intermediate machines to be run at a higher speed. Wire on these intermediate machines is currently being run at a conservative speed of from 5 to 6 thousand fpm and, in some instances, is being successfully drawn as high as 10,000 fpm on size .016, and we are experimenting now at 17000 fpm. The finishing machines also followed the same trend with a comparable increase in speed.

✦ ✦ ✦

Older Types of Dies

AT the time sintered carbide was introduced, the only dies then in common use (aside from the diamond dies for small sizes of wire which still have their place in the industry) were the multiple-hole, chilled-iron dies — by far the most popular then — and also the steel or whortle dies that could be peened back and again reamed to their original sizes.

✦ ✦ ✦

THESE steel dies were used principally on the fine wire blocks for drawing of both wet and dry wire, while the chilled-iron die was used mostly on the larger size, and both had the same characteristic, namely, poor wearing quality.

✦ ✦ ✦

CHILLED-IRON dies were usually not used below .080, and it was necessary to start a bundle at least .002 under size, and by the time the bundle was finished the wire gauged .002 to .003 oversize. The wire was usually out of round and many times its surface was very rough so that the slightest sliver or scale in the bundle would cause very rapid die wear and leave scratches or fins on the remaining bundle of wire.

✦ ✦ ✦

IN the drawing of both ferrous and non-ferrous wire, the chilled-iron die could only draw one bundle of wire averaging from 150 to 225 pounds per bundle, and then the finished bundle had to be split as it was being drawn oversize.

✦ ✦ ✦

THE successful use of carbide by the non-ferrous industry lead to early trials in the steel industry. Experimental dies soon appeared in both the wire mill and cold-drawn plants and the tube-drawing industry.

✦ ✦ ✦

ALTHOUGH we were optimistic at this time, we soon encountered difficulties which were not experienced in the copper industry. Due to the greater drawing pressures, dies began to break at far lower hole sizes, and a great deal of development was necessary on both shaping of dies and also on the casing of the nibs.

✦ ✦ ✦

THE acceptance of carbide in both the steel and copper mills was very slow at first due to the great price differential between the steel and cast iron dies then in use, and tungsten carbide. Because of the high initial cost of carbide, the dies were purchased almost singly, and this procedure required a great effort to establish their use and the dies had to run the gamut of many tests and trials in the mills themselves. These few early trials, however, soon convinced the wire manufacturers that carbide, in spite of the high price, did offer some very definite advantages over other types of dies.

✦ ✦ ✦

WITH carbide, the wire was held in size over long runs, thus eliminating the cutting of a certain number of rounds at the beginning and end of the bundle in order to conform to specified tolerances. The finish produced by carbide was much better than the finishes produced by other types of dies.

✦ ✦ ✦

SCRAP, always a problem in the mills due to out of round, oversize, scratches, etc., was practically eliminated — so much so that wire had to be drawn for baling nails and other uses which previously had been made from reject wire.

✦ ✦ ✦

Evolution of Basic Die Shape

WHILE we were introducing these dies, the only shapes we knew were the same as used in diamond dies which we later found to be inapplicable to carbide. Due to the small size of the stones, a wide parabolic curve and a short bearing was imperative, and the shapes varied with the sizes of the stones.

✦ ✦ ✦

CARBIDE being relatively softer than a diamond and also a cemented material with a controlled nib height and diameter, required a change and standardization of shapes. The original shape was tight parabolic curve with a long bearing designed to compensate for the difference in hardness. This proved to be unsatisfactory because it was impractical to duplicate the shape, and maintain correct bearing length. These variations contributed to die breakage and undue friction which resulted in poor lubrication causing both galling of wire in die as well as rapid die wear. These conditions also caused trouble with the wire being drawn in short bundles, runouts, fish hooks, shove-ups, broken points, and, at times, excessive sucking down of the wire.

✦ ✦ ✦

FINALLY one of the superintendents of a wire mill who had tried a considerable number of these dies with rather indifferent success had asked us to let him have a few dies to make in his die room. He believed that they could be made to run satisfactorily. This was subsequently done with successful results. The die manufacturer was told how the die was made, and this was the first start in actually putting a definite contour or shape into a die. The carbide die, after that, took on the first definite resemblance to the dies we have now — that is, it had a definite bell, entrance angle, bearing and back. A basic shape was thus developed.

BY gradually co-relating a trial-and-error composite of information on these early installations which was obtained from various mills operating under varied conditions, and drawing different types of wire, we gradually arrived at the formulae to be used in the shaping of dies. It was found that even the best material, with improper entrance angle or length of bearing not only shortened the life of a die even made it unusable.

✦ ✦ ✦

VARIOUS theories had been developed by mills, and a good deal of theoretical work and research had been done to establish the requirements for length of bearing, entrance angles, backs, etc., which I will not discuss in detail now. The important fact is that different materials require different shapes, lubricants and speeds. These are all important in the efficiency of the die. I might bring out, at this point, that a properly shaped die, affects both the finish and quality of the wire. A great deal of attention is usually paid to the finishing die in the average mill. This is desirable in-so-far as it affects the finish and appearance of the wire. I feel, however, that more attention should be paid to the ripper and breakdown dies because if they are correctly shaped and the wire reaches the intermediate and fine machines in good condition, not much trouble will be encountered there.

✦ ✦ ✦

THE rod sizes vary greatly as received from the rod mills and it is often several gauges oversize as well as out of round. This fact is usually disregarded, consequently no changes are made either in drafting practice or die shaping to compensate for this increased rod size. I feel more wire is spoiled at this point and immediate succeeding passes because of improper die design than at any other point.

✦ ✦ ✦

IT has been found there are times, under proper operating conditions, that in order to draw good wire, it is often good economy to sacrifice a certain amount of die life in order to obtain certain desired characteristics. We have learned that improper entrance angles, or bearing lengths, may produce wire that is visibly good while it is being drawn in the coarser sizes and yet cause trouble by the time the wire reaches the very fine sizes even though the dies and lubricants be perfect and machines set-up properly.

✦ ✦ ✦

RESEARCH done in recent years leads me to the conclusion that a great deal of trouble encountered in the wire mill is not caused in the finishing end but rather is due to the general practice of disregarding the shapes employed in the ripper dies.

✦ ✦ ✦

I FEEL that more wire is spoiled there than in any other place in the mill. In normal operating circumstances, the rod sizes vary greatly and instead of being a No. 5 rod, it is often several gauges larger and out of round. The fact is that often times no changes are made in the drafting practice or of dieing to compensate for the increased rod size; therefore the proper die shape — meaning a sufficient opening together with the proper entrance and drawing angles — is vital.

✦ ✦ ✦

THE length of the bearing is important mainly in that it affects the productivity or the life of the die. In many cases, the longer bearing will result in increased die life; however, in the drawing of certain materials, a larger bearing means greater friction which often spoils the wire and therefore the shape of the die must be changed accordingly.

✦ ✦ ✦

Die Machinery Developed

AT first, all Carbide Dies were sold to the mills as finished dies. That is, the dies were ordered finished on the sizes required. When they became worn out, they were returned to the manufacturer to be recut and finished to the next gauge.

WIDE-SPREAD use of finished Carbide Dies was found to be impracticable because of the extremely high initial cost of the great number of new dies required to completely equip the mills.

✦ ✦ ✦

OTHER drawbacks were the inability of any die manufacturer to service all the recutting of thousands of dies, and also the prohibitively large inventory of spare dies required by a mill to substitute for a great number of worn dies in transit.

✦ ✦ ✦

THE initial machinery for manufacturing sintered carbide dies was being gradually developed and perfected, and at this stage it had reached the point where these machines could be offered to the wire mills for servicing and recutting dies in their own plants. This step gave sintered carbide dies quite an impetus, but it was still inadequate.

✦ ✦ ✦

Rough-Cored Dies

IN order to bring the initial installation price of carbide within a more economical range, the first rough-drilled dies were introduced. These were followed by the rough-cored die, which is the present form in which the great majority of dies are furnished.

✦ ✦ ✦

WHEN this was done, the last resistance against sintered-carbide dies was wiped away, and the wire mills were in a position to make the fullest use of carbide. They gradually eliminated other types of dies and standardized exclusively on carbide die.

✦ ✦ ✦

AVAILABILITY of die machinery led to its purchase by all the wire mills. They installed complete die rooms for making and servicing all of their own wire dies. Today, each wire mill is a complete unit, able to carry on the servicing and recutting of dies to fill their own requirements.

(Please turn to Page 569)

Sub-Sieve Diamond Powders For Die Work

PART II

By Paul L. Herz,
Technical Advisor and Manager,
Belgian Tool Co., (Malines, Belgium).

"Helpful Formulae"
"How to Increase Facilities"
"Selection of a Liquid"
"Experimenting with Decarbation"
"Difficulties and How to Overcome Them"

Part I. Showing Experiments, Microphotographs, etc., was published in August issue. ✦ ✦ ✦

Helpful Formulae

ONE of the most helpful instruments in experimenting with decantation and a shortcut through the maze of physical data to be taken up is a formula derived from the Stokes law which gives the value of a resisting force (F) when a spherule moves through a more or less viscous liquid.

✦ ✦ ✦

THE formula is function of the velocity (v) of the particle of radius (r), falling in a liquid of viscosity (n).

$$F = 6\pi nrv$$

on the other hand the general law on the fall of particles gives a value for F as a function of (g) the gravity.

$$F = \frac{4}{3} r^3\pi \ G(d_1-d_2)$$

where d_1 is the density of the particle and d_2 that of the liquid. We can thus write

$$6\pi nrv = \frac{4}{3} r^3\pi \ G(d_1-d_2)$$

which can be arranged to

$$v = \frac{2}{G} Gr^2 \frac{(d_1-d_2)}{\pi}$$

We can further simplify by replacing g with its approximate value of 980 and d_1 by the average density of diamond or 3.5 and we have

$$v = \frac{218r^2(3,5 - d_2)}{n}$$

✦ ✦ ✦

THIS gives us but three variable factors and we see immediately that;

1. **The rate of fall of the particle can be slowed down by increasing the viscosity of the liquid and vice-versa.**
2. **The rate of fall of the particle increases rapidly with its size because it is proportional to the square of its radius.**
3. **The lower the density of the liquid the higher the speed of fall.**

WE can now, in theory at least, grade diamond particles at will if we select a liquid with appropriate density and viscosity and a vessel of adequate dimensions.

✦ ✦ ✦

WHILE the law of Stokes is right for small spheres, experiments with other undetermined forms resembling the sphere and roughly equivalent on a volume basis have proven that the law applies to them as well except when the particles are too flat, too long, or both. Let us examine what happens in such cases.

✦ ✦ ✦

WE do find in the records some formulae for round flat particles when falling perpendicularly to the largest face or sideways that is parallel to the largest face.

✦ ✦ ✦

THESE are of no interest to us because they do not check with experimental results. Diamond particles never occur in flat circular shapes of even balance. When flat (flakes), the largest surface is usually shaped like an elongated triangle, sometimes like a rectangle tending towards a rhomb and the thickness is irregular.

✦ ✦ ✦

IN such cases the speed of fall as well as the course of the particle will be influenced principally by the degree of "streamlining." For instance if the particle has a rounded nose and a tapering tail it will travel a perpendicular course and encounter a resistance which may be 1/25 of that met by a circular round flake.

✦ ✦ ✦

THE lower the viscosity of the liquid, the more erratic will be the course. In water, these particles may spiral down, slide sideways and perform all kinds of unpredictable antics.

✦ ✦ ✦

THIS will also be true for needles." Decantation in oil has a tendency to minimize the effects of the irregularity of the shapes. When the particle is covered with a film of oil it acts as corrective streamlining.

✦ ✦ ✦

IT is known that when particles travel through a liquid in a cylinder there are; wall, bottom and surface effects which influence the velocity.

✦ ✦ ✦

FORTUNATELY the bottom and surface effects will not interfere with decantation when particles are very small and the cylinder high, but the wall effect requires investigation.

✦ ✦ ✦

LADENBURG(*) gives a correction of the Stokes law for the effect of the walls which is a "diameter sphere/diameter cylinder" relation where "D" is the diameter of the cylinder.

(*) Handbuch der Exper. Physik (Schiller) 2ter teil band4 seite 347ect.

$$F = 6\pi nrv\left(1 + 2{,}4\,\frac{2r}{D}\right)$$

Faxen(*) made a further correction as follows:

$$F = 6\pi nrv\left(1 + 2{,}1\,\frac{2r}{D}\right)$$

If we assume the diameter of the largest particle decanted to be 100 microns and that of the cylinder 10 centimeters, the term $\left(1 + 2{,}1\,\frac{2r}{D}\right)$ becomes $1 + 2{,}1\,\frac{0{,}01}{10}$ or 1,0021 which is too small a correction to affect the final value of F. when the diameter of the cylinder is at least 100 times that of the particle.

✦ ✦ ✦

IN conclusion we see that we can apply the formula

$$V = \frac{218\,r^2(3{,}5\text{-}d^2)}{\pi}$$

without being inconvenienced by the lack of uniformity of diamond particles, that we may ignore the surface and bottom effects as well as the wall effect when our vessel is a cylinder of fair height at least 4 inches wide.

✦ ✦ ✦

How to Measure Particles

THE measuring of diamond particles raises a complex problem on account of their lack of defined geometrical form which precludes geometrical measurement.

✦ ✦ ✦

WE can thus hope for nothing but a practical method of size appraisal. What matters is that our yardstick be indicative of volume.

✦ ✦ ✦

WE have seen that the grading requires the assumption that when the particle is equal to a sphere on a volume basis it behaves as such. This assumption is correct as proven experimentally.

✦ ✦ ✦

DECANTATION of diamond powders in oil will separate particles according to volume although some may have one or two dimensions which are exaggerated to the detriment of the third. Normal particles averaging in dimension like 6½/4½/3 are in the great majority with extreme measurements in the ratio— 7/4½/2½ or any combination thereof with 7 as maximum and 2½ as minimum.

✦ ✦ ✦

ABOVE and below these extremes, particles would be needles, flakes or slivers. These can be ignored, firstly because we cannot eliminate them, secondly on account of their small numbers and relative harmlessness.

✦ ✦ ✦

AS we know, diamond powders work virtually squeezed between a tapered needle and the walls of an inverted cone. The needle pounding as it revolves, quickly breaks up all grains too long in one dimension and thus too thin in another.

✦ ✦ ✦

WE need therefore not worry unduly about needles, flakes, points and slivers unless their volume exceeded that of the ideal grain size which cannot be the case.

✦ ✦ ✦

IT can also be added that most irregular particles have streamlined features which accelerate their speed and make them settle with normal particles of greater volume.

✦ ✦ ✦

OUR particles being microscopic we must devise a handy way of bringing a typical sample within focus for measurement. To that effect, a sample of the powder is deflocculated and spread on a slide. (Fig. 7). The field is scanned through the microscope with appropriate enlargement until a typical group of particles is found. When the slide is well prepared, some 80% of the particles will rest upon their largest surface so that they offer their two largest dimensions for measurement.

✦ ✦ ✦

AT first glance it may seem that the group contains a high percentage of needles and no flakes. This seems so because some normal particles lie on their side and all flakes lie flat on their largest surface. These can be told apart from normal blocks. While microphotographs do not register relief a little practice will enable anybody to tell needles and flakes from blocks. Visual examination of course being stereoscopic permits immediate detection of such particles which need not be measured. As normal particles lying on their side will average like the others, they, as well as needles and flakes can be ignored.

✦ ✦ ✦

THE actual measurement can be done in three ways:

1. **With an eyepiece micrometer with movable hair.**
2. **With a counting block placed on the stage.**
3. **By microphotography.**

✦ ✦ ✦

THE next step is to find an adequate way of measuring the particles. Obviously we cannot merely measure the longest dimension which generally includes a sharp apex.

✦ ✦ ✦

IT will be noticed that the width averages half the sum of the length and thickness so that if we take it as the average diameter of the particle it will roughly represent that of the sphere of equal volume.

✦ ✦ ✦

THERE still remains to determine how to measure the width as the walls are not parallel. We cannot arbitrarily take the longest perpendicular to the longest dimension because we would most of the time be measuring diagonals. Therefore it is best to measure our width on a line which according to our judgment, divides the surface in two equal parts.

✦ ✦ ✦

TO this measurement we then apply a correction also based on judgment.

✦ ✦ ✦

THE thickness as seen in Figs. 1/7 can be appraised. (It may not be so clear on a picture but when seen through the microscope we get a good idea of the relief).

If we find it to be below normal average of 6½/4½/3, we shift our measurement slightly towards a narrower cross-section and vice-versa if the particle is thicker than average, always with the same objects in view; to come as close as possible to the diameter of the sphere of equal volume.

✦ ✦ ✦

Selection of a Liquid

IN selecting a liquid, only density and viscosity must be considered. The density must be below that of the diamond and in selecting the viscosity it must be so chosen that it will not take an unreasonable amount of time for the finest particles to settle. As the diamond is not affected by any liquid at normal temperature we may choose any liquid form of matter or combination thereof.

✦ ✦ ✦

A POINT which should not be overlooked is the ultimate manner in which the powder is to be used. Probably, it will be mixed with oil. In that case it is to great advantage to grade with the same oil. This avoids additional manipulation and cleansing. For economy's sake one should select a liquid with stable properties so that it can be used over and over again.

✦ ✦ ✦

PURE olive oil has given good results in die work and is excellent for grading as well.

✦ ✦ ✦

Experimenting With Decantation (Fig. 8)

A GLASS cylinder "A" 36 inches high and 5 inches inside diameter fits into a rounded bottom vessel "B." The latter is 2 inches deep and is fitted with a stop-cock.

✦ ✦ ✦

THE cylinder is filled up to the 32 inch line with pure olive oil of known density and viscosity, kept at constant temperature. A quantity of powder is thoroughly mixed with two inches of same oil in vessel "C" which is identical to "B."

✦ ✦ ✦

THE contents of "C" are then carefully emptied into the cylinder "A". After a certain time, let us say 20 minutes, the largest grains have made their way to the bottom of "B."

✦ ✦ ✦

INCIDENTALLY, the equation giving the value of "v" will give us the required time of fall for particles of every diameter.

✦ ✦ ✦

THE stop-cock is then opened and the column of oil is drained into another vessel A_1, identical to A, fitted with a bottom vessel similar to B and C.

✦ ✦ ✦

"B" will contain our first and largest grain sizes .Nrl.

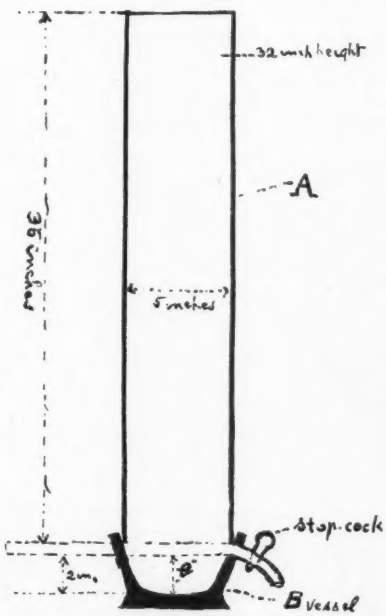

Fig. 8—Experimenting with decantation. ✦

OF course the oil column "e" left in vessel B above the sedimented powder contains some grains on the way down so that it is best to let it settle a while before pouring off the surplus oil which can be added to cylinder A_1.

✦ ✦ ✦

WE are now ready to process our powder Nr2.

✦ ✦ ✦

OUR cylinder A_1 contains powders afloat in a column of oil 32 inches high, plus the oil of vessel C.

✦ ✦ ✦

OUR object now is to condense into the B vessel of cylinder A_1 the largest particles out of which we will grade our N2 powders. The time required for this preliminary operation is calculated on the basis of how long our Nr2 grains (which ever size we want them to be) take to travel about 34 inches. We can accelerate the fall in this case by raising the temperature of the oil. This will change its viscosity. The

(*Please turn to Page 572*)

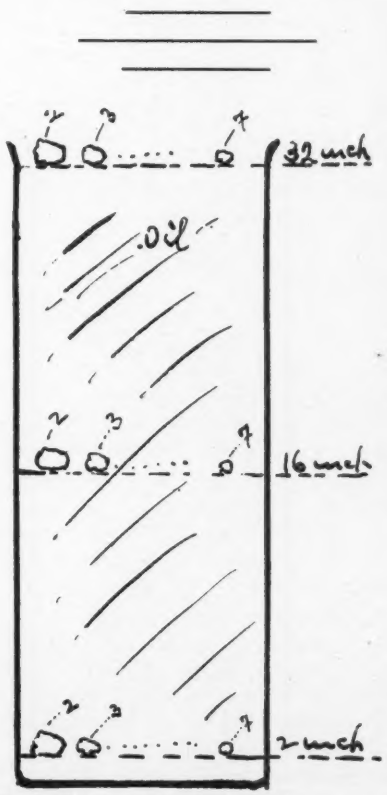

Fig. 9—Experimenting with decantation ✦

Small Diamond Die Industry Advisory Committee Meeting Brings Out Interesting Facts On Die Situation

Industry Advisory Committees are representative groups formed for the purpose of furnishing advice and information to the War Production Board on matters furthering the war effort. The summary of the May meeting presents some unusually interesting information for die men, including an analysis of British Die Production methods. ✦ ✦ ✦

MONTHLY consumption of small dies to draw superfine wire increased 17 per cent for the first quarter of 1944 over that for the last quarter of 1943, Mr. Leveridge of the Miscellaneous Minerals Division told committee members. Although the increase did not continue in April and May, the number of dies requested monthly has not varied greatly during the first 5 months of 1944. The easier situation on dies has made it possible for die makers to continue to concentrate on improved quality.

✦ ✦ ✦

THE life of the average domestic die now approaches 70 per cent of that of the average prewar imported die. The Division will make every effort, either through the present research projects or by other means, to bring about the production of a die which will equal the best imported dies, provided of course that the Government continues to participate in the diamond-die program.

✦ ✦ ✦

DR. **Whittaker** of the National Research Council is now an official consultant to the WPB. Recently Dr. Whittaker went to England to investigate British methods of die production. Reports by Dr. Peters and Dr. Insley, both of the Bureau of Standards, have been issued recently by the Academy of Sciences.

✦ ✦ ✦

AS a result of the Government inspection system reintroduced in January and the consequent rejection of many dies because of poor quality, the stockpile of dies has not greatly increased since the last committee meeting. Much time has also been devoted to the retention in die-producing plants of those young drillers and polishers without whose special skills continuance and improvement of quality production would not be possible.

✦ ✦ ✦

Requirements for Dies

REQUIREMENTS for dies during the remainder of 1944 are most uncertain, a wire producer stated. In the field of instrumentation, which represents about 15 per cent of fine wire users, his company will produce in December only 40 per cent of the wire made in April. He pointed out that other fields will be affected by a decrease in instrumentation uses. Another wire producer said that demands for wire, and consequently dies, seem to be fairly constant. He noted that demands for wire in the triple 0 sizes are less than they were a year ago, while those in the .001 to .0015 size range have increased somewhat. A third wire producer expected an increase of from 20 to 35 per cent in tungsten and tungsten-molybdenum alloy wire.

✦ ✦ ✦

A COMMITTEE member expressed the fear that fine wire may be going into stocks instead of being currently consumed. Another member believed that this might be true, and noted that wire customers are not complaining when their shipments are delayed. Mr. Leveridge called attention to the fact that estimates for 1944 wire requirements in the .0015 size and smaller are for 25 per cent more wire than was drawn in 1943.

✦ ✦ ✦

Supply of Dies

THERE is every indication that the die industry can supply a sufficient number of dies to meet the requirements of wire producers, Mr. Leveridge stated. He asked committee members whether die production would continue adequate as to quality and quantity if present Government contracts and allocations were not continued. A wire producer believed that discontinuance of allocations might be a benefit in that it would stimulate competition in the die industry. A die producer pointed out, however, that part of the die industry is dependent on the production of small dies to remain in business and that consequently discontinuance of Government contracts and allocations would affect production adversely. He stated that, without allocation, pressure upon a die producer by an important wire customer might oblige him to sell his entire production to that customer. He did not believe such a practice is good for war production. Another die producer concurred, and a third stated that, without Government allocation and contracts, his company would cut down production facilities to actual orders received. Should those orders increase, it would require a long time for the

company to come back into quantity production. Two other die producers said that they would continue to operate in much the same way as at present if Government contracts and allocations were not continued. They indicated that, as the larger part of their production is in noncritical dies, they are not entirely dependent on the production of small dies.

✦ ✦ ✦

A DIE producer inquired whether wire manufacturers would pay a higher price for a better die that would produce more wire. He claimed that a better die could not be produced at existing price levels. A wire producer stated that his firm would not pay more since it believed that the price is high enough.

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A COMMITTEE member suggested that a 2-month allocation system might be tried instead of the present monthly system so that there could be a carryover from one month to the next.

✦ ✦ ✦

A WIRE producer said that his company's stocks of dies in the critical size range varied from 2 weeks to 2 months or more. Another wire producer said that his company is dependent on current production for dies in the critical sizes as its stocks amount to only a supply of 2 or 3 weeks, Mr. Leveridge said that a total of some 6,000 dies are in Government stocks although only half of them are in sizes currently in demand. Government stocks also include dies made some time ago, the quality of which is not the highest.

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Increased Productivity of Dies

ALTHOUGH domestic dies are not as efficient as foreign dies obtained before the war, their quality is undoubtedly improving, Mr. Rockwell said. Dr. Insley spoke of the adoption by different members of the die industry of the cone illuminating method for inspection developed at the Bureau of Standards. Committee members stated that the new method is a contribution of considerable importance to the die industry. A description of the method has been published and sent out in order that it may be available to producers.

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MR. O'ROURKE of the Miscellaneous Minerals Division mentioned improvement in polish and contour of dies. He pointed out that the amount of wire being drawn per die is increasing. A weighted average of wire produced per die in sizes under .0015 for 1943 and 1944 is as follows:

1943				1944
1st Q.	2nd Q.	3rd Q.	4th Q.	1st Q.
3.2	3.5	3.7	4.2	3.7

✦ ✦ ✦

A COMMITTEE member said that the decrease in the number of pounds for the first quarter of 1944 might reflect the drawing of a larger amount of lighter-weight wire.

✦ ✦ ✦

DR. PETERS said that work on the improvement of die release and back has not progressed far enough to warrant any conclusions. A report published on an electrical spotting process developed by the Bureau of Standards has been sent to the die industry. A report on diamond powder has been made and will be distributed. At present the grade numbers of powder made by the various producers are not tied in with particle size. The Bureau of Standards is developing commercial standards which will be submitted to members of the diamond powder industry for their consideration.

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DR. PETERS stated that it would be helpful to the Bureau if each die producer sent in a half-dozen dies for a check on quality. No dies have been received at the Bureau for some time.

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Technical Mission to England

DR. WHITTAKER reported to the committee as follows on the results of a diamond die technical mission sent to England to study the die industry from March 8 to April 18:

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General Organization

THE organization of the diamond die industry in Great Britain is different from that in the United States. This fact must be kept in mind when comparisons are made between the industries of the two countries. There are 17 die shops in Great Britain, 12 of which are operated by large wire-drawing firms. These firms take care of practically all of their own die requirements, which amount to 40 per cent of the total number of dies required in Great Britain. As the firms are in a position to absorb heavy experimental costs, quality of dies may be stressed rather than cost. The question of quality at a cost, which frequently arises between user and maker, its nonexistent in a large part of the British die industry. Four commercial die companies and one government-owned die shop compose the rest of the industry. One of the commercial firms makes 40 per cent of all dies produced at a profit. The total demand for diamond dies is about 20 per cent of the demand in the U. S. The demand in the critical range of dies, those below .0015, is about 10 per cent of the demand in the U. S. The relatively low cost of British dies results entirely from the very low rate of wages paid to operators as compared with American rates.

✦ ✦ ✦

Manufacturing Methods

ALL of the plants in the industry employ the European process for fine die-making. This process is in various stages of refinement in the various plants. The leading plants have developed to a high degree of perfection the French horizontal method of drilling. The use of viewing windows, microscopes, and indicating controls on the machines has changed the operation from one of drilling by feel to one in which the operator gauges the work as it progresses. Dr. Whittaker described

the continental process of die making in detail.

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THE sizes of powder used for each of the drilling operations are generally as follows for fine dies:

Rough coning	**50 and 20 microns**
Medium drilling	**20 and 8 microns**
Fine drilling	**8 and 5 microns**

✦ ✦ ✦

OF interest in connection with large dies is the method of mounting smaller-sized stones than is customary in hard metals in order to economize on large diamonds. This practice is known as "reinforcing." By this means a 2-carat stone instead of a 4½-carat stone may be used for a .050 die. Problems encountered are the increased difficulties in drilling a reinforced mounted stone and the shorter life of dies when reinforced after drilling.

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Efficiencies of Die Manufacturers

IT is difficult to assess the efficiencies of the different shapes because of the variety of sizes and the slightly different practices. A method has been worked out for the appraisal of efficiency, which takes into account the sizes of the dies produced. A unit has been determined on the basis of the average man-hours required in three plants for the production of various sizes of dies. Selected unit values for several sizes of dies are given below to indicate the relationships established:

Size of die	**.0004**	**.0005**	**.0008**	**.001**
Unit value	**10**	**8**	**5**	**4**
Size of die	**.002**	**.008**	**.02**	**.04**
Unit value	**2**	**1**	**2.2**	**4**

✦ ✦ ✦

BASED on the number of operators and the number of dies produced, the average operator-hours per die ranges between 20 and 50 among the die shops. The over-all averages for the industry, on the same basis, is about 25 operator-hours per die. The size distribution of all dies made is roughly the same as that in the U. S.

Developments on Methods in Progress

SEVERAL experiments are in progress having for their objective the speeding up of the drilling operations. Those worthy of mention have to do with vertical-spindle-type coning machines. The Diamond Die and Tool Control and the industry are of the opinion that the vertical drilling principle has great possibilities. They are very much interested in vertical automatic coning and further development of automatic drilling.

✦ ✦ ✦

A VERTICAL coning machine, using a solenoid for controlling the frequency of oscillation and equipped with a metal-bonded diamond grinding wheel which engages the drilling needle automatically, has been built by Davidson of Wire Drawing Dies Company. A number of machines have been built for large dies and are in use. Davidson hopes to use the same principle for small dies. Drilling rates of .006″ per hour have been reached on dies .015″ to .020″ in size.

✦ ✦ ✦

EXPERIMENTS with the single-head National Wire Die Company automatic coning machine are being conducted by Leeds at General Electric Company, Wembley. He submits results obtained on 25 dies as follows: Mean coning time—5 hours, 25 minutes; rate of coning in inches per hour—maximum .00835, minimum .00394, mean .00594. He is coning to an average depth of 30 to 35 thousandths, to sizes of .001-.0015 at base, with cone angle of about 23 degrees, using GEC grade 50 (17 microns) powder in alcohol.

✦ ✦ ✦

LEEDS considers the automatic control of needle shape, possible with the National machine, to be as important as the fast rate of drilling obtained, thus enabling precise and uniformly shaped dies to be produced independently of the operator. Uniformity from one die to another is not possible when die shape is dependent on the shape imparted manually by the operator to the needle, he feels.

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EXPERIMENTAL work towards increasing drilling rates has taken a different direction at British Insulated Cables Company, which has been experimenting with a variety of powder vehicles. The objective is to find a nonlubricating liquid which has the desired viscosity for use with diamond powder in place of olive oil which it is believed has a lubricating action on the diamond powder thereby reducing the cutting ability. By the use of a nonparaffinic vehicle, piercing times have been reduced to one-quarter those obtained with a paraffinic vehicle.

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Form and Quality of Dies

CONSIDERABLE attention has been given in England to the most suitable form of die for drawing of different classes of metals, the degree of polish required, and the necessity of freedom from cracks and imperfections.

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THERE are of course variations of form and quality among dies made by various manufacturers. Standard practice of the commercial die firms is to attempt to produce the form and polish specified by the customer.

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OPINION concerning die shape is in agreement in a general way as to the shapes required for the broad classes of wire. The critical components of the die are considered to be (1) the reduction cone, (2) the bearing, and (3) the relief. The favored dimensions for the critical components for the different classes of wires are set out in table A on the page following.

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(Relief angle for all classes of wire 10-15 degrees, sharp relief for tungsten class wire.)

TABLE A

Class of Wire	Reduction Angle	Bearing Length
Tungsten/Moly	8-10 degrees	(1½-2) x dia.
Resistance/Steel	10-14 degrees	(1-½) x dia.
Brass/Bronze	10-14 degrees	½ x dia.
Copper/Precious	18-20 degrees	(⅓-½) x dia.

BELL, approach, and back opening angles are not thought to be critical, but must be ample for ready cleaning and lubrication. All angles, it is felt, must be rounded and smoothed into one another. This produces a long narrow shape for hard metals and a flared shape for soft metals.

✦ ✦ ✦

ALL are in agreement that a high degree of polish on the surfaces of the reduction cone, bearing, and relief parts of the die is most desirable. Further, a first class surface polish is necessary for copper wire drawing. A somewhat lower degree of polish may suffice for hard wire drawing.

✦ ✦ ✦

Die Specifications Drawn Up

THE DDTC Technical Panel on Dies has focused the attention of the entire industry on die shape by drawing up a specification for dies, which has recently been promulgated by the British Standards Institution as a war emergency specification. The specified shapes represent the combined practical experience of the diamond die and wire drawing industry of Great Britain. Although the shapes are not the result of precisely controlled experiments, the specification is the first of its kind and is an important step in that it represents the present-day collective knowledge of the industry concerning the best shape and finish of dies for different classes of wire drawing. The tolerances imposed are considered to be unattainable by the die makers, who are in agreement, however, that in general outline the proposed forms are the correct ones so far as is now known. The DDTC feels that the tolerances constitute a target to be aimed at.

Wire Drawing

WIRE drawing practices in England were observed to be essentially the same as those used in the United States.

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Die Performance

ACCORDING to information obtained from several representative British wire manufacturers, the performance of dies appears to be about the same in the industries of Great Britain and the United States.

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Comments on Dr. Whittaker's Report

COMMITTEE members believed that the study of British experience in die making should be of aid to the American die industry.

✦ ✦ ✦

MR. ROCKWELL raised the question of whether it is desirable to establish specifications for diamond dies in this country as has been done in Great Britain. One of the committee members thought that such a step is desirable as a goal toward which the die industry may work. Other members doubted whether it is necessary to actually set up such standards. Dr. Whittaker declared that any advancement in this country over the British methods must come as a result of our systematic study of dies and wire-drawing processes. In answer to a question, by Mr. Leveridge, Dr. Whittaker believed it unnecessary to demonstrate to American producers the British practice of "reinforcing" dies.

✦ ✦ ✦

Labor and Selective Service Efficiency Rating Method

THE method worked out in the British die industry to evaluate the efficiency of die plants, Dr. Whittaker reported is as follows: A set of values has been determined, giving ratios for producing various sizes of dies. An efficiency index is computed as follows:

✦ ✦ ✦

THE number of dies made per month at each size is multiplied by the unit value for the size to give the total units for each size. The total units are summed up to give the total number of units produced per month. This value is divided by the total operator-hours for the month. This figure is known as the efficiency index and can be compared from month to month to judge the efficiency of the operations.

✦ ✦ ✦

Other Labor Problems

AN industry member said that in some cases it is all important to industry to keep key employees under 26 when they are called up for the draft. Mr. Leveridge stated that he would continue to give every assistance to industry in obtaining necessary deferments.

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Wages

A COMMITTEE member said that his company is not permitted by the War Labor Board to pay sufficient wages to get high-calibre employees. Mr. Leveridge inquired about the efforts members of industry have made to appeal labor rate decisions. He called attention to efforts made for one of the producers, who succeeded in obtaining authorization for increased rates. It was suggested that producers help each other with advice.

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Rough Diamonds

THE supply of rough diamonds continues to be adequate, committee members reported. Prices of good clear stones are high.

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THOSE attending the meeting were: Kenneth A. Harvey who

(Please turn to Page 579)

Ten Recommendations For the Use of Diamond Drawing Dies

The data presented was arranged by The Diamond Trading Company, Ltd., of London, England, in collaboration with British Diamond Die Makers and is presented here by permission of the Industrial Diamond Review, of London, England.

1 — Annealing and Pre-Treatment

WIRE drawing often requires repeated intermediate annealing of the wire for drawing down to fine gauges. For this purpose it is essential that the wire be perfectly clean and free from oxidation, as well as being of a uniform malleability. The presence of patches of oxide causes a succession of blows to the diamond dies exactly as in the case of imperfectly annealed wire. As the diamond is very sensitive to shocks, a careful pre-treatment is indispensable.

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BULK annealing in electric or gas-fired furnaces with non-oxidising atmosphere is not always suitable for every metal; in particular non-ferrous alloys have a tendency to cake and show discolouration. In such cases the wire must be carefully pickled and cleaned before re-drawing. It is recommended to "condition" pickled wire first by drawing it through one tungsten carbide die before drawing through diamond dies in order to avoid abrasive action on the diamonds.

✦ ✦ ✦

ANNEALING in non-oxidising atmosphere is very suitable for copper wire in coils or on bobbins; the wire becomes perfectly bright and is ready for use without any further processing like pickling or cleaning.

✦ ✦ ✦

SOME well refined and rolled copper can be drawn to fine limits throughout in its hard drawn state. Copper of best quality, for instance B.C.R. Copper, can be drawn from the rod direct on to steel reels holding 500, 800 or 1,000 lbs., and can be re-drawn straight from the reels to small gauges without intermediate annealing.

✦ ✦ ✦

2 — Die Holder and its Treatment

IT is recommended that the die should be freely movable in the holder, or the holder so designed as to give universal adjustment so that at all times the wire is straight from cone to cone and coaxial with the die bore. According to this opinion the use of rigid die holders as employed in cone type machines and of those without adjustment should be discouraged. If the die cannot be adjusted the running wire might wear on the metal cone causing misalignment of the wire.

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THE practice should be abandoned to turn down the metal drawing cones when grooved during service, without due regard to re-aligning the die holder; thus causing excessive stress on one part of the diamond die. Some wire drawers prefer, however, fixed die holders, relying on the accuracy of the diamond die. Even in this case, the last die holder should be made adjustable to give perfect cast to the finished wire, should it begin to curl on account of the wear of the die. Wear on the metal cones of fixed die holders can be countered to some extent by banding, i.e., hard metal rings of appropriate diameters are let in the die block.

✦ ✦ ✦

3 — Introduction of Wire

THE wire has to be introduced into the die from the entry side. The mounting (brass or other corrosion resistant metal) usually shows size and trademark on the entry side. Additionally, a circular groove between outer edge and hole is provided as distinguishing mark, visible even when covered with oil and swarf.

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4 — Lubrication and Cooling

DURING the drawing operations the die has to be lubricated by a suitable compound and eventually cooled.

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5 — When to Withdraw

IF a stone in a set of dies begins to scratch or the drawing load is increased, it should be immediately removed and slightly repolished, otherwise the hole in the diamond becomes oval and rough, causing premature failing.

✦ ✦ ✦

6 — Spare Dies

TO avoid interruption of the drawing operation when a stone shows signs of fracture, uneven wear or undue enlargement, it is recommended to have suitable spare dies at hand for the various sizes and kinds of wires to be drawn. Well run mills go sometimes a step further, always hav-

(Please turn to Page 580)

PROGRAM

Wire Association Wartime Emergency Convention

Pittsburgh, Pa., October 16-19, 1944 Association Headquarters—William Penn Hotel

Wire Association Headquarters at The William Penn Hotel

Will Be Open from Monday, October 16, All Day and Every Evening During the Convention

—Come and Get Acquainted!

THERE WILL BE A REGISTRATION FEE OF $5.00 FOR THOSE ATTENDING THESE TECHNICAL SESSIONS AND INFORMAL MEETINGS

✦ ✦ ✦ ADMISSION WILL BE BY BADGE ONLY ✦ ✦ ✦

Open Discussions Will Be held On the Papers Presented and These Discussions Will be Published in the January, 1945, Issue of Wire and Wire Products

PROGRAM COMMITTEE

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Firth-Sterling Steel Co.,
McKeesport, Penna.

Hotel reservations should be made by members of The Wire Association direct to the Secretary prior to October 10, 1944. *Watch out for this — Make your plans now to attend and send your reservation card in promptly.*

MONDAY, OCTOBER 16 — 10:30 A. M. DIRECTORS' MEETING — 12 NOON PROGRAM COMMITTEE LUNCH

Registration and Information at William Penn Hotel — October 16-19 — in charge of Mrs. R. S. Spengel, Secy.-Treas., WIRE & WIRE PRODUCTS.

— The Technical Sessions —

ALL RESEARCH PAPERS ARE PREPRINTED IN THE OCTOBER ISSUE OF WIRE AND WIRE PRODUCTS

The Discussions and the Mordica Memorial Lecture Will be Printed in the January, 1945 Issue of Wire and Wire Products

MONDAY, OCTOBER 16 Afternoon Session — 2:30 P. M.	E. W. Gundstrom, Asst. Plant Manager, Chairman of Meeting	Rome Cable Corporation, Rome, N. Y.
OPENING ADDRESS	D. D. Buchanan	President of the Wire Association
LECTURE: "Safety in Wire Mills"	R. H. Ferguson, Manager of Safety,	Republic Steel Corporation, Cleveland, Ohio
LECTURE: "Handling Wire Mill Labor Problems"	John J. Sanderson, Asst. Supt. Wire Mills,	Keystone Steel & Wire Co., Peoria, Illinois
TUESDAY, OCTOBER 17 Morning Session — 9:30 A. M.	Julian L. Schueler, General Superintendent Chairman of Meeting	Continental Steel Corp., Kokomo, Ind.
PAPER: "Cleaninghouse Practices"	F. P. Spruance, Vice-President,	American Chemical Paint Co., Ambler, Pa.
PAPER: "Variable Speed Transmissions for the Control of Tensions and Velocities in Processing Wire and Cable"	J. H. Gepfert, Engineer,	Reeves Pulley Co., Columbus, Ind.
TUESDAY, OCTOBER 17 Afternoon Session — 1:30 P. M.	W. H. Crawford, Resident Manager, Chairman of Meeting	Reliance Spring Washer Div., Eaton Mfg. Co., Massillon, Ohio
PAPER: "Some Factors Influencing the Drawing of Fine Wires"	H. P. Edinga, Factory Manager,	Wire Division, North American Philips Co., Dobbs Ferry, N. Y.
PAPER: "A Reappraisal of Electro-galvanizing"	Ernest H. Lyons, Jr., Chief Chemist,	The Meaker Co., Chicago, Ill.
PAPER: "The Physical Properties of High Carbon Steel Rope Wire As Affected By Variations in Patenting."	Howard J. Godfrey, Development Engineer	John A. Roebling's Sons Co., Trenton, New Jersey
WEDNESDAY, OCTOBER 18 Morning Session — 10:00 A. M.	D. D. Buchanan, President, The Wire Association, Chairman	
PAPER: "Dies"	A. R. Zapp, Manager, Firthaloy Div.,	Firth-Sterling Steel Company, McKeesport, Pa.

THE MORDICA MEMORIAL LECTURE

To Be Presented By
A. M. Reeder,
Metallurgical Engineer,
Jones & Laughlin Steel Corp.
Pittsburgh, Pa.

SUBJECT: "CARBON STEELS FOR THE WIRE INDUSTRY"

WEDNESDAY, OCTOBER 18
1:00 P. M.

WIRE ASSOCIATION LUNCHEON — WILLIAM PENN HOTEL

— GUEST SPEAKERS —

— TO BE ANNOUNCED —

(Members are at liberty to bring guests. Ladies are welcome)

WEDNESDAY, OCTOBER 18
4:00 P. M.

Wire Association Annual Meeting
D. D. Buchanan,
President, The Wire Association

CHAIRMAN OF MEETING

WILLIAM PENN HOTEL

WEDNESDAY, OCTOBER 18
Evening — 7:30 P. M.

ANNUAL DINNER — STAG SMOKER — WILLIAM PENN HOTEL

A. R. ZAPP,
Manager, Firthaloy Division,

Firth-Sterling Steel Company
McKeesport, Pa.

CHAIRMAN OF COMMITTEE

THURSDAY, OCTOBER 19
Morning Session — 9:45 A. M.

C. A. Litzler, Chief Engineer,
Chairman of Meeting

The Industrial Oven Engineering Co.,
Cleveland, Ohio

PAPER: "Dissertation on Light Metal versus Copper Wire"

G. W. Ahrens,

Wopis Industrial Laboratory,
New York, N. Y.

PAPER: "Discussion on the New Plastic—Polythene and It's Adaptation for Insulation of Electric Wire and Cable, together with a Discussion of Plastic Used with Nylon in a New Switchette"

Dr. J. W. Shackleton,
Plastics Div.,

E. I. DuPont de Nemours Co.,
Wilmington, Delaware

THURSDAY, OCTOBER 19
Afternoon Session — 1:30 P. M.

H. W. Anderson, President
Chairman of Meeting

Fidelity Machine Co.,
Philadelphia, Pa.

PAPER: "Synthetic Insulation and Jackets for Wire and Cable"

G. A. Rolston,
Chief Engineer,

Rome Cable Corp.,
Rome, N. Y.

PAPER: "Covering Weatherproof Cable"

H. Kaffine,
Chief Mech. Engr.,

Fidelity Machine Company,
Philadelphia, Pa.

PAPER: "Lacquers and Saturants"

Russ Jordan,
Engineer,

Ault & Wiborg,
Cincinnatti, Ohio

THE WIRE ASSOCIATION MEDAL AWARDS

For the Most Meritorious Paper on Wire Manufacture or Fabrication During the Year.

MEDAL AWARDS

1934 — EDWARD J. P. FISHER
Metallurgist, Keystone Steel & Wire Co., Peoria, Ill.
Title of Paper: "COLD DRAWN STEEL SPRING WIRE"

1935 — BENJAMIN LEWIS McCARTHY
Metallurgist, Wickwire Spencer Steel Co., Buffalo, N. Y.
Title of Paper: "GRAIN SIZE AND ITS INFLUENCE ON THE MANUFACTURE OF STEEL WIRE"

1936 — ROBERT NOTVEST
Chief Engineer, Welding Division, J. D. Adams Mfg. Co., Indianapolis, Indiana
Title of Paper:
"STEEL FOR ARC WELDING ELECTRODES"

1937 — BENJAMIN LEWIS McCARTHY
Chief Metallurgist, Wickwire Spencer Steel Co., Buffalo, N.Y.
Title of Paper:
"ABNORMAL GRAIN GROWTH AND THE ANNEALING OF LOW CARBON STEEL WIRE"

1938 — WALTER R. BLOXDORF
Metallurgist, The MacWhyte Co., Kenosha, Wis.
Title of Paper: "WIRE ROPE"

1939 — STANLEY P. WATKINS
Manager, Sales Development, Rustless Iron and Steel Corp., Baltimore, Maryland
Title of Paper:
"THE MANUFACTURE AND USE OF STAINLESS STEEL WIRE"

1940 — ROBERT W. SANDELIN
Metallurgist, Atlantic Steel Company, Atlanta, Georgia
Title of Paper:
"GALVANIZING CHARACTERISTICS OF DIFFERENT TYPES OF STEEL"

1941 — CARLETON W. GARRETT
Wire Mill Metallurgist, Jones & Laughlin Steel Corp. Aliquippa, Pennsylvania
Title of Paper:
"A BRIEF DISCUSSION ON THE MANUFACTURE OF STEEL FOR ARC WELDING ELECTRODES"

1942 — LEROY DEVOE SEYMOUR
Asst. Works Manager, Canada Works, Steel Company of Canada, Ltd., Hamilton, Ontario, Canada
Title of Paper:
"SCHEDULING AND PLANNING THE WIRE MILL FOR WAR PRODUCTION"

1943 — JOHN C. AIKEN
Asst. Supt., Rod and Wire Mills, Jones & Laughlin Steel Corp., Aliquippa, Pa.
Title of Paper: "DRAWING HIGH SPEED ROPE WIRE"

HONORABLE MENTIONS

1935 — L. D. SEYMOUR
Metallurgist, Rod and Wire Dept., Youngstown Sheet & Tube Co., Youngstown, Ohio
Title of Paper: "COLD HEADING WIRE"

1935 — R. A. SCHATZEL
Superintendent, General Research Laboratories, General Cable Corp., Rome, N. Y.
Title of Paper: "HARD AND SOFT COPPER WIRE"

1936 — BENJAMIN LEWIS McCARTHY
Metallurgist, Wickwire Spencer Steel Co., Buffalo, N. Y.
Title of Paper:
"PLASTIC DEFORMATION IN WIRE DRAWING"

1937 — ROBERT W. SANDELIN
Metallurgist, Atlantic Steel Co., Atlanta, Ga.
Title of Paper:
"A METALLURGICAL STUDY OF THE FACTORS AFFECTING THE QUALITY OF GALVANIZING"

1937 — ALLAN B. DOVE
Chemical Engineer, Canada Works, The Steel Company of Canada, Ltd., Hamilton, Ont., Canada.
Title of Paper:
"A. C. ELECTRO PICKLING—A BETTER METHOD OF PICKLING"

1938 — RODMAN R. TATNALL
Metallurgist, Morgan Works, Wickwire Spencer Steel Co., Worcester, Massachusetts
Title of Paper: "RESILIENCE OF SPRINGS"

1938 — JOSEPH A. DOYLE
Vice President, W. S. Rockwell Co., New York, N. Y.
Title of Paper: "HEATING COPPER WIRE BARS"

1940 — H. BLOUNT and J. D. WILTRAKIS
Mfg. Engineer, Point Breeze Works, Engineer, Kearny Works, Western Electric Company
Title of Paper:
"DESIGN AND OPERATION OF A NEW COPPER WIRE DRAWING PLANT"

1941 — RODMAN R. TATNALL
Metallurgist, Morgan Works, Wickwire Spencer Steel Co., Worcester, Massachusetts
Title of Paper:
"TIME, TEMPERATURE AND SIZE IN THE HEATING OF STEEL WIRE"

1942 — COLONEL FRANK W. BULLOCK
Signal Corps, United States Army
Title of Paper: "THE WIRE INDUSTRY IN WAR"

1943 — E. J. CRUM
General Foreman, Bethanizing and Galvanizing Departments, Bethlehem Steel Company, Sparrows Point, Md.
Tile of Paper: "THE GRAPHICAL SOLUTION OF WIRE MILL MATHEMATICAL PROBLEMS"

ANNUAL MEDAL AWARD OF THE WIRE ASSOCIATION

FOR THE MOST MERITORIOUS PAPER ON WIRE MANUFACTURE OR FABRICATION DURING THE YEAR
— BY A MEMBER OF THE WIRE ASSOCIATION —

ALL members of the Wire Association are cordially invited to submit technical papers either for publication in "WIRE & WIRE PRODUCTS" during the year or for presentation before the Annual Wire Association Convention.

✦ ✦ ✦

AN annual medal will be awarded in each of the two major divisions of the activities of the Association, to the papers coming nearest to the requirement set forth above.

✦ ✦ ✦

CONSIDERATION for the Medal Awards is not limited to the papers presented at the Annual Meeting, but is given to all papers submitted by members and published in "WIRE & WIRE PRODUCTS" during the year.

✦ ✦ ✦

ADDITIONAL information may be obtained by addressing:

✦ ✦ ✦

SELECTION of papers to be presented at the Annual Convention rests in the hands of the Joint Program Committee and the Board of Directors of the Wire Association.

✦ ✦ ✦

ALL papers submitted become the property of the Wire Association and the Board of Directors constitutes the Committee on Awards.

✦ ✦ ✦

300 MAIN STREET **RICHARD E. BROWN, SECRETARY, THE WIRE ASSOCIATION** STAMFORD, CONNECTICUT

✦ GOVERNMENT WIRE PRODUCTION INFORMATION ✦

Component Parts for Wire and Cable

ALL component parts going into completed wire and cable will now be handled by the Copper Division, which has been made a claimant agency, War Production Board officials have informed the Copper Wire and Cable Industry Advisory Committee at a recent meeting.

✦ ✦ ✦

THE Copper Division will be responsible for representing the wire and cable industry in conjunction with other industry and material divisions on such products as cotton, steel, polyvinyl chloride and other materials going into finished copper wire and cable, a WPB official said.

THE supply of components is tight, but additional capacity for some elements may soon be provided, and delivery of others may be assured by direction, the committee was told.

✦ ✦ ✦

TIGHT supplies of materials and facilities have necessitated directives to all copper wire mill warehouses and all copper wire mills, establishing a quota limiting the shipments on "V-3" orders to consumers, dealers and repairmen operating under Controlled Materials Plan Regulation No. 9, a Copper Division official said. As a result, more copper wire mill products will directly serve the war effort, he indicated.

Insect Wire Screen Cloth

MILITARY and essential civilian requirements for insect wire screen cloth for the fiscal year of 1944-1945 will exceed those of the fiscal year of 1943-1944 by approximately 24 per cent, Government officials informed the Insect Wire Screen Cloth Industry Advisory Committee at a meeting recently.

✦ ✦ ✦

ARMY and Navy representatives indicated that their requirements will increase approximately 25 per cent. A spokesman for the WPB Office of Civilian Requirements said that 400,000,000 square feet of insect wire will be needed for essential civilian maintenance and repair in the next 12 months, as compared with the 325,000,000

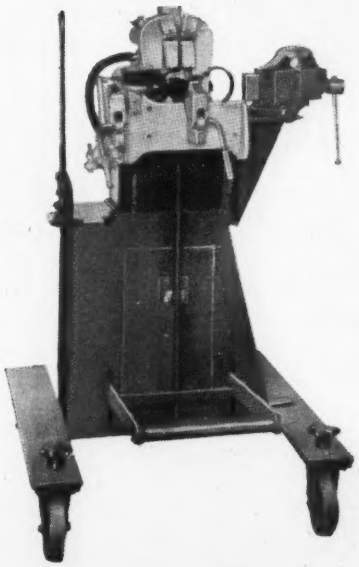
(Please turn to Page 560)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY
20 NORTH WACKER DRIVE, CHICAGO 6, ILL.
Telephone, State 7468

*Speeding War Production

*Army-Navy "E" Award to Mall Tool Company Chicago, Illinois

Mall FLEXIBLE SHAFT Tools
REG. U.S. PAT. OFF.

Made with KEYSTONE Wire

Like the strong, sinuous arm of a trained athlete . . . delivering *power* to the exact spot . . . adaptable to thousands of positions and uses . . . these are speed-production advantages of Mall Tools, made with special Keystone flexible shaft wire.

Important to the war effort is the use of Mall Flexible Shafts in the control of aircraft fuel pumps, tachometers, generators, super-chargers, gun turrets and other vital parts where accurate, positive control is absolutely necessary.

We are proud that special Keystone wire fully measures up to these important applications.

KEYSTONE STEEL & WIRE CO., Peoria 7, Illinois

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE — KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Coppered, Tinned, Annealed, Galvanized

Government Wire Production Information

(Continued from Page 559)

square feet used during the last fiscal year, an increase of approximately 23 per cent.

✦ ✦ ✦

COMMITTEE members said the present labor forces must be expanded if both civilian and military demands are to be fulfilled. To encourage labor to come into the plants, committee members suggested wage adjustments. They also urged that the War Manpower Commission give the industry higher priorities on referrals.

✦ ✦ ✦

Contractors Guide Simplifiies Termination of Contracts

MAJOR questions confronting war contractors are answered in a new booklet for both prime and subcontractors, "The Contractors Guide." Written in nontechnical language and graphically illustrated to emphasize salient points, the booklet is another step in the program of the Readjustment Division, Army Service Forces, to simplify action and promote speedier settlements of terminated contracts. (Copies for editorial use are available upon application to Publications Branch, War Department Bureau of Public Relations. Readers should be advised, however, to secure their copies from War Department procurement offices throughout the country.)

✦ ✦ ✦

THE work is the result of months of field experience by the procurement services, and of studies and suggestions from industry and national trade associations as reported to the Readjustment Division, which has staff function in making policies to handle the increasing load of termination settlements.

✦ ✦ ✦

CONTRACTS are being terminated now by the field officers of the procurement services in order to clear the way for manufacture of new and better weapons

coming from the drawing boards and laboratories, and from tests at the fighting fronts. "The Contractors Guide" is designed to aid industry by giving the busy executive a quick preview of the job to be done.

✦ ✦ ✦

WRITTEN for contractors holding fixed-price supply contracts with the War Department, the publication sets forth the chronological actions in a termination settlement. The Guide emphasizes preparation for termination by listing steps the contractor may take before any of his contracts have been terminated.

✦ ✦ ✦

BASED on the Army's procedures in Procurement Regulation No. 15, the booklet has three main sections. The first gives the ABC of terminations. The second suggests things the contractor can do in his shop, with the Government, and with his suppliers and subcontractors. The last contains facsimiles of the new uniform termination forms.

✦ ✦ ✦

ON these simplified forms, obtainable from field procurement offices, the contractor submits the facts about his inventory and costs, charges and proposed profit. It was emphasized that the new Guide deals only with that part of the action required of the contractor, and omits all action required of the Government, thus giving the contractor a concise picture of his role in obtaining a fast, fair and final settlement of his terminated contracts.

✦ ✦ ✦

MANY war contractors with terminated contracts are not submitting claims promptly to procurement offices. Pointing out that the Government cannot settle a contract until the contractor puts in his statement of costs, inventories and charges, the War Department states that the new "Contractors Guide" should quicken this process by promoting knowledge of the contractor's responsibilities and procedures.

✦ ✦ ✦

Booklet on Safety

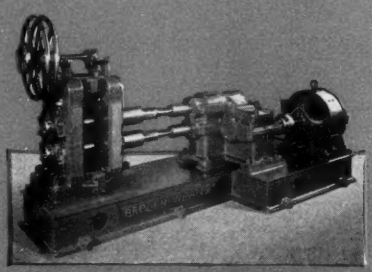
THE Department of Labor has recently issued a booklet entitled, "Safety Through Management Leadership" aimed primarily at the smaller war plants which can rarely employ safety engineers, this pamphlet cites the actual experience plants of varying sizes have had in organizing for safety.

✦ ✦ ✦

SINCE the message is directed to management, and asks for the drive and leadership that management can supply, you may want to call the publication to the attention of your readers. Copies may be secured so long as the free supply lasts from the Division of Labor Standards, U. S. Department of Labor, Washington, 25, D. C.

(*Please turn to Page 562*)

WEAN-BRODEN



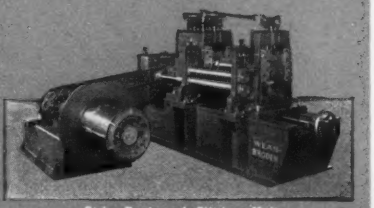
Small Cold Rolling Strip Mill

THE Wean Engineering Company, Inc., have long been recognized as specialists in sheet, strip and tin mill equipment . . . The Broden Construction Company specializes in the manufacture of narrow strip and wire mill equipment.

With the extended facilities of The Broden Construction Company as a subsidiary of The Wean Engineering Company, Inc., it is now possible to serve the steel industry more effectively.

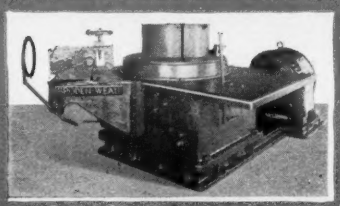
COLD ROLLING MACHINERY
For 36" Wide Material and Narrower
Mills • Reels • Slitters • Levelers • Coilers
Edgers • Scale Breakers • Shears
Scrap Ballers • Continuous Pickling

WIRE MILL EQUIPMENT
Wire Drawing Machines • Patenting
Galvanizing and Tinning Take-Up Frames
Wire Flattening • Spoolers • Nail
Galvanizing and Blueing

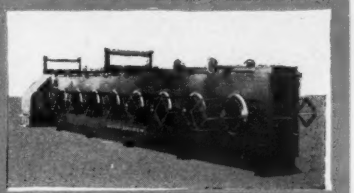


Strip Reel and Slitting Unit

HOLMQUIST BARBED WIRE and WIRE FENCE MACHINERY



Special Alloy Single Draft Heavy Duty Vertical Wire Drawing Block for ⅛" Round Wire



The BRODEN CONSTRUCTION Co., Inc., Cleveland, O.
A SUBSIDIARY COMPANY OF
The WEAN ENGINEERING Co., Inc., Warren, O.

Government Wire Production Information

(*Continued from Page 561*)

Insect Screening Released for Civilians

THE War Production Board has announced releases for civilian use of 669,947 square feet of insect screening which is under control of the Metals Reserve Company.

✦ ✦ ✦

THIS action, which is taken in Amendment No. 4 to Copper Conservation Order M-9-c as amended May 26, 1944, also releases undetermined quantities of copper screening which have been frozen in the hands of miscellaneous holders.

✦ ✦ ✦

IN order to assure that the stocks of such screening are distributed equitably among users, no person is permitted under the amendment to deliver more than 50 square feet to other than (1) jobbers, wholesalers and retailers or (2) government agencies. The amendment also removes restrictions on cutting and installing new and uncut rolls of copper insect screening.

✦ ✦ ✦

Spectrographic Analysis of Metals

TRADITIONAL chemical methods of analyzing metals are yielding to the more modern spectrographic technique, thus saving time, manpower and money for war industries using metals, the War Production Board has reported.

✦ ✦ ✦

THOUGH the spectrographic method has existed for some years, it has been made more effective recently as wartime demands grew in volume and necessitated a speedier, less costly procedure to analyze metals, WPB officials explained.

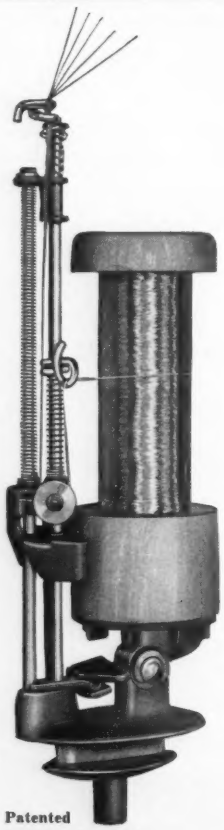
THE spectroscope, which decomposes a beam of light, or radiant energy, into its constituents, has solved many problems created by war activities. The spectrographic technique is now standard for aluminum and magnesium alloys and many steels, officials said. This method can accomplish an accurate analysis, in many instances, where chemical methods are not sufficient, it was explained.

✦ ✦ ✦

TWO typical examples follow:

✦ ✦ ✦

IT has been established that a concentration of about two hundredths of one per cent tin is harmful for many steels. With the increased use of scrap, such a tin content is not uncommon. A chemical analysis to determine the tin content requires about eight hours while a spectrographic analysis is



Patented
2 BX - Special
MOSSPEED Carrier.

MOSSPEED BRAIDER CARRIERS
FOR BRAIDING
MULTIPLE ENDS OF FINE WIRES

A special design MOSSPEED CARRIER and BOBBIN is supplied for braiding "SHIELDED" WIRE & ETC.

Will braid multiple ends of fine aluminum, brass, bronze or copper wire, Etc.

SHEAVE-WHEEL on braider-stop and SPECIAL-THREADEYES on carrier, together with new type BOBBIN provides an even wire "let-off" resulting in a high quality and uniform braided shield.

Consult our engineers regarding your braiding problems.

MOSSBERG
Pressed Steel Corp.
18 West Street
Attleboro, Massachusetts, U. S. A.
European Agent
James Day (Machinery), Ltd., "Ford House", 88 Regent St., London, W. I., England
Ross Whitehead & Co., Ltd., Montreal and Toronto, Canada.

made in less than ten minutes. The latter can be made while the furnace is waiting.

✦ ✦ ✦

ANOTHER example is found in magnesium alloys. A calcium content of about one tenth of one per cent destroys the usefulness of many such alloys, it was explained. Because of the great chemical similarity of calcium and magnesium, there is no chemical method to detect such amounts of calcium. The spectrograph accomplishes this without difficulties, experts revealed.

✦ ✦ ✦

MANY more similar cases might be cited which show that the war production has been facilitated by the use of the spectrographic methods of analysis.

✦ ✦ ✦

Silver Plating On Aluminums

SILVER may now be deposited Electrolytically onto aluminum or aluminum alloys by means of a simple method, known as the **PREPLATE PROCESS**; a development of the Technical Processes Division of Colonial Alloys Company, Philadelphia, Pa.

✦ ✦ ✦

SILVER deposits of considerable thickness can go directly onto the aluminum surfaces, or follow a copper, nickel, zinc or cadmium deposition.

✦ ✦ ✦

THE aluminum is thoroughly cleaned as prescribed, passivated, immersed in PREPLATE SOLUTION for a few seconds, and then electroplated in the usual manner, using the regular equipment found in all shops.

✦ ✦ ✦

TORSION, heat, corrosion resistance and weathering tests have shown up well. Adherence is good.

✦ ✦ ✦

BECAUSE of its high rate of conductivity, silver plating onto light weight aluminums, opens up vast possibilities in the electrical, equipment, appliance, transportation and communications fields.

✦ ✦ ✦

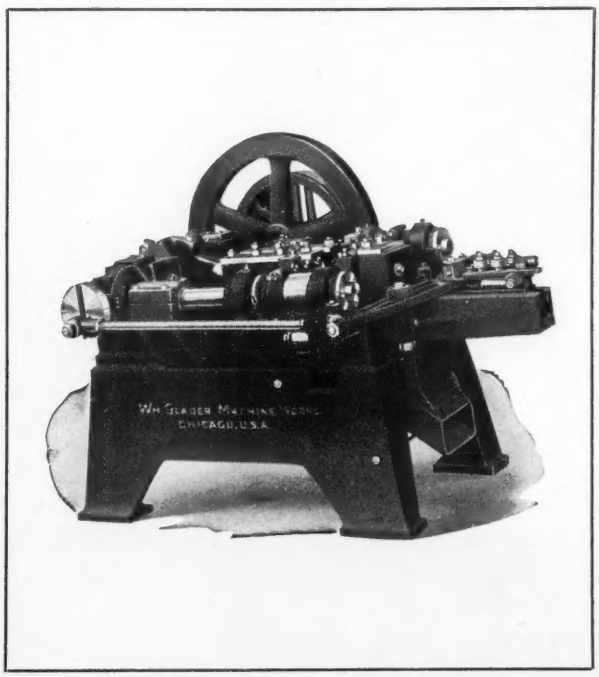
HIGH frequency, electronic, sending and receiving transmission units, instruments, contact points and energizing mechanisms may improve the quality of many products.

✦ ✦ ✦

RATED high on the scale in heat conductivity and transfer, silver on aluminums may be considered favorably in many heat transfer applications.

Our advertising pages — have you studied them carefully? They contain information to guide you in the successful operation of your business. And when you write an advertiser for prices, catalogs or detailed data, won't you please say you saw his ad in WIRE AND WIRE PRODUCTS.

GLADER HIGH SPEED WIRE NAIL MACHINE



High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS

210 NO. RACINE AVE.
CHICAGO, ILLINOIS

Outstanding Personalities of the Wire Industry

James R. Longwell
Director of Engineering and Research, Carboloy Co., Inc.

APPOINTMENT of **James R. Longwell** as Director of Engineering and Research at Carboloy Company, Inc., has been announced by **W. G. Robbins**, Carboloy President. During his fifteen years with Carboloy, Mr. Longwell has been successively Development Engineer, Chief Engineer and Factory Manager.

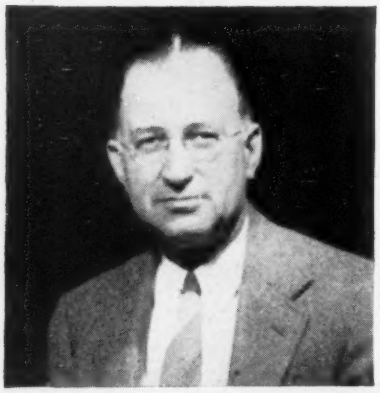
✦ ✦ ✦

IN his new capacity **Mr. Longwell** will direct the extensive engineering and research program of Carboloy on new products and new processes necessitated by the tremendous expansion in use of the carbide cutting tools, dies, dressers, core drills and carbide metal for wear resistance applications.

✦ ✦ ✦

S. W. Fletcher, President, J. O. Ross Engineering Corporation

S. W. **FLETCHER**, for many years Executive Vice-President of the J. O. Ross Engineering Corporation, has been elected President of that company and will continue to make his headquarters in New York. **A. E. Montgomery** will continue as Vice-President of the company with his headquarters in Chicago.



S. W. FLETCHER
President
Ross Engineering Corp.

ANNOUNCEMENT has also been made of the following other officers: Vice-Presidents — **H. G. Rappolt** and **F. W. Partsch**; Treasurer — **J. A. Ronder**; Secretary — **R. W. Grott.**

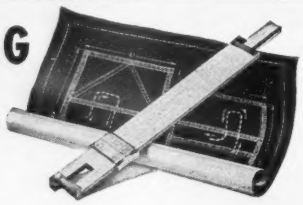
✦ ✦ ✦

Foss Heads Riehle's Boston District Sales

WINFRED L. **FOSS** has been appointed manager of its Boston district sales territory of the American Machine and Metals, Inc., East Moline, Illinois, and will have offices at 409 Park Square Building in Boston.

Born in Washington, D. C., Mr. Foss studied at the Massachusetts Institute of Technology and, following service in World War I, at Columbia University.

OVEN ENGINEERING NEWS



IOE Control Systems Step Up Efficiency, Simplify Operation Of Automatic Oven Installations

All oven conveying and processing equipment supplied by **IOE** includes complete temperature, work-flow and safety controls, synchronized and interlocking. The system shown above, which was designed, built, installed and shop wired to control all phases of operation of an extremely large low-temperature processing unit, typifies **IOE** completeness of installation.

The basic circuit of this system consists of wholly automatic sequence and cycle control of seven interlocked 175-foot-long mechanical pushers, each equipped with its own reversing motor drive. Five of these operate on alternate cycles, and two on independent time-actuated control impulses. A master production schedule pre-determines the proper cycles for efficient processing.

Ingenious interlocking controls prevent operation of any conveyer unless pre-determined safe conditions exist. For instance, an unclosed oven door or a blocked alley will ring a bell and flash a light. Although the system may seem elaborate, it contributes to operating economy by assuring smooth production flow within the close temperature limits prescribed, without undue maintenance cost or difficulty. Pneumatic-electric temperature controls at various points throughout the system maintain temperatures constantly within a ±3° differential. Further saving is effected by elimination of attendant labor; push-button starting and stopping is the only manual operation involved.

Free Engineering Data

"Blueprint for Industry—II" contains details of many unusual heating and processing systems. Write for it TODAY!

(This is No. 14 of a series. Reprints of previous advertisements will be sent free upon request.)

THE INDUSTRIAL *Oven Engineering* COMPANY

11621 Detroit Avenue **Cleveland 2, Ohio**

Frederick C. Knowles, Boron Carbide Engineer, The Norton Company, Worcester, Mass.

FREDERICK C. KNOWLES has been appointed Boron Carbide Engineer by **Norton Company,** Worcester, Mass. He will make his headquarters at the Norton Detroit Warehouse and will cover the Cleveland, Detroit and Chicago territories. Mr. Knowles has had long, practical experience in the manufacture of gages and will devote a considerable part of his time to engineering work on the application of **Norbide** gages.

✦ ✦ ✦

B. R. Newcomb, President, John Waldron Corporation

B. R. NEWCOMB has been elected President of the John Waldron Corporation of New Brunswick, New Jersey, the oldest and

B. R. NEWCOMB

one of the largest builders of industrial processing machinery. Mr. Newcomb was formerly with the Worthington Pump and Machinery Corporation and more recently with the American Optical Company.

✦ ✦ ✦

S. N. FINNEY AND F. W. EGAN, both long associated with the Waldron organization, have been elected Vice-Presidents of the Corporation.

R. G. Wingerter, Asst. Chief Engineer, Industrial Division, Timken Roller Bearing Co.

R. G. WINGERTER, for the past six years an industrial engineer for the Timken Roller Bearing Company has been appointed assistant chief engineer for the Industrial Division.

✦ ✦ ✦

MR. Wingerter is an honor graduate of Wayne University and holds a Bachelor of Science degree in Mechanical Engineering. He is a member of the Society of Automotive Engineers and the Detroit Engineering Society.

✦ ✦ ✦

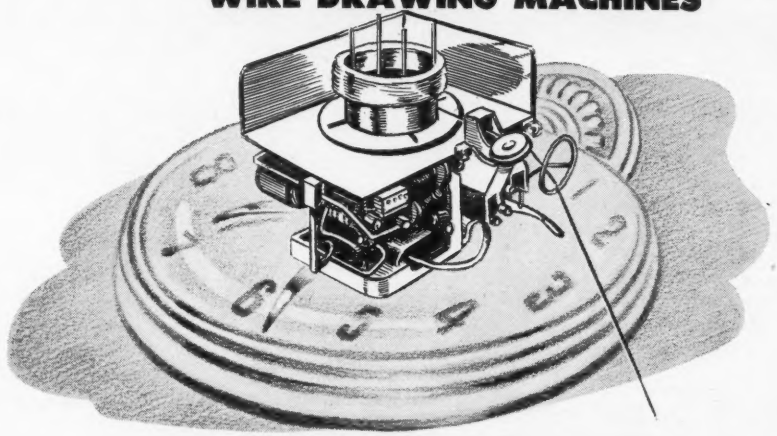
William B. Marvin

WILLIAM B. MARVIN, secretary of Farrel-Birmingham Company, Inc., died August 13,

(*Please turn to Page 567*)

S-T-R-E-T-C-H

THE PRODUCTIVE TIME OF YOUR WIRE DRAWING MACHINES

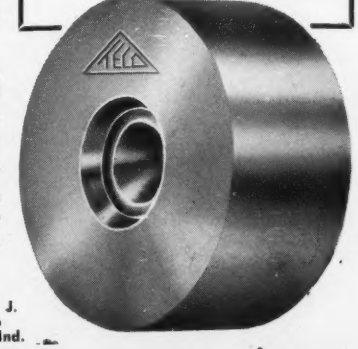


with TECO Carbide Dies!

You get more productive time from your wire drawing machines when they're equipped with TECO Carbide Dies—because you waste less time in shutdowns for die changes! TECO Cemented Carbide stays on the job longer because it is harder, denser, more uniform—therefore more resistant to wear and friction.

Make a test run in your plant. Compare the output of TECO Carbide Dies with that of your present dies. You'll find that slow-wearing, smooth-wearing TECO Carbide Dies draw greater tonnages of smoothly-finished, on-size wire. Our engineers are glad to discuss your needs.

Wire and Bar Dies—Sizing Dies
Extruding Dies—Tubing Dies
Carbide Blanks, Tools, Bits, Reamers, Broaches, Forming Tools



Tungsten Electric Corporation, 564 39th St., Union City, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects & Builders Bldg., Indianapolis, Ind.

TECO Pioneers in Tungsten Carbides for over a Quarter Century **CARBIDE DIES**

A Review of Recent Wire Patents

No. 2,352,622, COUNTER ASSEMBLY FOR WIRE PRODUCTS MACHINES, patented July 4, 1944, by George K. Gaummer, Sterling, Ill., assignor to Northwestern Steel & Wire Company, Sterling, Ill., a corporation of Illinois.

The machine is one adapted to fabricate wire products, such as wire bale ties, formed in bundles of a fixed number of ties.

✦ ✦ ✦

No. 2,352,623, BUNDLER AND DISCHARGE ASSEMBLY FOR WIRE PRODUCTS MACHINES, patented July 4, 1944, by George K. Gaumer,, Sterling, Ill., assignor to Northwestern Steel and Wire Company, Sterling, Ill., a corporation of Illinois.

In this aspect of the wire products machine, the invention lies in the provision of a floating apparatus which wedges the wire used to tie the bundle and carry it around the bundle for twisting.

✦ ✦ ✦

No. 2,352,938, SEAT CUSHION, patented July 4, 1944, by John M. Caughey, Adrian, Mich., assignor to Stubnitz-Greene Spring Corporation, Adrian, Mich., a corporation of Michigan.

Hooked ends of cross wires, employed in this coiled-spring cushion, provide anchorage for a draw string associated with a removable upholstering cover for the cushion.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents; outside United States and Canada, $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

✦ ✦ ✦

No. 2,352,982, SCREW FOR PLASTICS, patented July 4, 1944, by Joseph John Tomalis, Providence, R. I., assignor to American Screw Company, Providence, R. I., a corporation of Rhode Island.

This screw has a shank polygonal cross-section with rounded corners throughout the major portion of its length, and has a continuous V-thread extending from one end of the shank for a number of complete helical turns about the full periphery of the shank.

✦ ✦ ✦

No. 2,353,030, THREAD FASTENER, patented July 4, 1944, by Emmet M. Green, Los Angeles, Calif.

This screw has a relatively sharp V-thread and the portion of the thread above the V-thread portion has a flat top and is of increasing width toward the head with a maximum width at its upper end. This upper end is rounded, beveled and spaced from the head.

No. 2,353,110, PLASTERBOARD NAIL, patented July 4, 1944 by Thomas P. Camp, Arlington Heights, Ill., assignor to United States Gypsum Company, Chicago, Ill., a corporation of Illinois.

A head is provided having an outwardly-extending recess, filled with plastic material, not subject to hammer blow breakage, so that the head will be inconspicuous.

✦ ✦ ✦

No. 2,353,315, LEAD HEAD NAIL, patented July 11, 1944, by James S. Maze, Peru, Ill., assignor to W. H. Maze Company, Peru, Ill., a corporation of Illinois.

The lead head extends around the upper end of the shank and around a flange integral with the shank, but the head does not extend over the upper face of the shank end.

✦ ✦ ✦

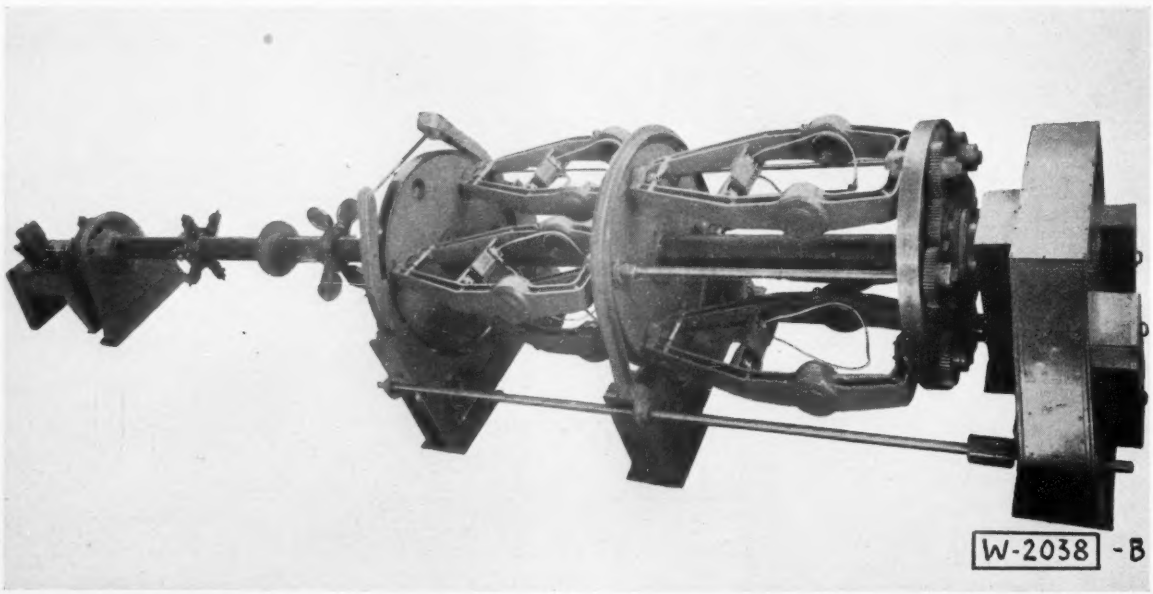
No. 2,353,531, CAP SCREW, patented July 11, 1944, by Davil B. Whitney, Waterbury, Conn.

Between the inner face of the head and the shank is an enlarged cylindrical flange provided with vertical exterior ribs and horizontal radial ribs on the undersurface thereof, these ribs being in alignment, whereby a number of angular

THE WATSON MACHINE COMPANY
PATERSON, NEW JERSEY, U.S.A.

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

6-SPOOL 10-TON FLATTENED STRAND ROPE CLOSER. 3-Speed all-steel anti-friction, no-slap, retractable spool-pintle, rope friction cradles with quick-release cradle-shaft clutches and variable 1-in-8 to 1-in-50 positive-drive cushioned back-turn. U. S. Patents 2,208,914 & 2,270,093.



self-cleaning grooves are provided throughout the circumference of the flange.

✦ ✦ ✦

No. 2,353,576, MECHANISM FOR DRAWING WIRE, patented July 11, 1944, by Edwin J. McLlvried, Akron, Ohio, assignor to The Vaughn Machinery Company, Cuyahoga Falls, Ohio, a corporation of Ohio.

A normally stationary block, a carrier rotatable about the axis of the block, a die on this carrier adapted upon rotation of the latter to lay the drawn wire on the block, and guide means adapted to lead a wire coaxially of the carrier and thence to the die, the guide means including two sheaves mounted on the carrier, one having its axis substantially parallel to but spaced from and the other having its axis transverse of and closely adjacent to the axis of the block.

✦ ✦ ✦

Re 2,518, APPARATUS FOR APPLYING PROTECTIVE COATINGS TO SUSPENDED WIRES, CABLES, PIPES, AND THE LIKE, patented July 18, 1944, by Joseph R. McMahon and Elwood C. Springfield, Glendale, W. Va.

Spray Coats are provided for wires, etc., with the sprayer mounted upon a trolley rolling over the wires, etc.

✦ ✦ ✦

Outstanding Personalities of the Wire Industry

(*Continued from Page 565*)

after a short illness. He had been connected with the company for thirty-nine years, having entered the employ of Birmingham Iron Foundry in 1905. He was treasurer of the latter firm at the time of the amalgamation of the Farrel and Birmingham companies in 1927. He became assistant secretary and director of the new company, and after serving sixteen years in that capacity, was elected secretary in April, 1943, a post which he held at the time of his death.

✦ ✦ ✦

MR. MARVIN was born in Wilton, Conn., May 17, 1880, and was a direct descendent of one of the original settlers of Hartford in 1635. He was a resident of Ansonia for many years, where he took an active interest in civic affairs and community organizations. He was a member of the First Congregational Church, and at the time of his death was a member of the Board of Trustees. He had previously served for several years on the Ansonia Board of Education, and was a past president of the Ansonia Rotary Club. He was a 32nd degree Mason, member of George Washington lodge, A. F. and A. M., Mount Vernon Chapter R. A. M. of Ansonia, Union Council, R. and S. M., and New Haven commandery, Knights Templar.

✦ ✦ ✦

William A. Gilbery

ON July 1st, 1944, Mr. William A. Gilbery, Cable Division Buyer, of the Northern Electric Company, Montreal, Que., Canada, was retired at the end of 33 years service with the Company.

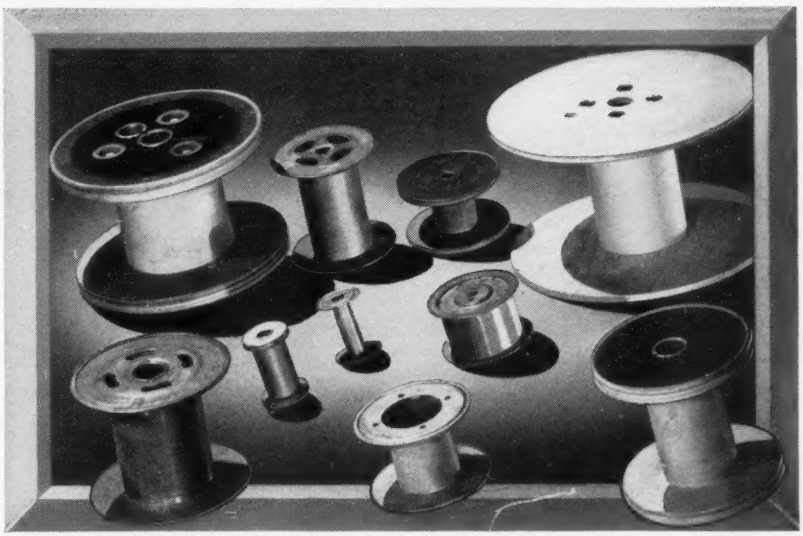
DURING this period Mr. Gilbery had actively engaged in the purchasing of raw materials and supplies for the Company. His successor is Mr. E. B. Conley who assumed the duties of the position as of July 1st, 1944.

✦ ✦ ✦

Hairston New Riehle Atlanta Sales Manager

GUY E. HAIRSTON has been appointed manager of its At-

(*Please turn to Page 568*)



PREPAREDNESS

MUST BE A PART OF TODAY'S PICTURE

Your preparations for future production will be far more effective if you consult Hubbard now about replacing worn out equipment. Hubbard spools and reels — carefully engineered to the job — put your plant on a "ready-for-anything" basis. Our complete line includes all sizes and types of spools and reels for wire drawing, annealing, stranding and shipping.

Buying this equipment today is an important step in keeping costs down, efficiency up. Drop us a line now about your needs—put Hubbard's 32 years of experience to work for you.

HUBBARD SPOOL COMPANY

1624 CARROLL AVENUE | CHICAGO 12, ILLINOIS

Since 1912, manufacturers of wire drawing and annealing, and shipping spools and reels.

PLANTS AT CHICAGO, ILLINOIS AND GARRETT, INDIANA

Outstanding Personalities of the Wire Industry

(*Continued from Page 567*)

lanta district sales territory according to an announcement by American Machine and Metals, Inc., East Moline, Illinois.

✦ ✦ ✦

MR. HAIRSTON, a native of Tennessee, is a graduate of Vanderbilt University with a degree in mechanical engineering. He served as production engineer for Campbell and Dann Manufacturing Company of Tullahoma, Tennessee, and later as sales supervisor for Firestone Tire and Rubber Company. Subsequently, he was appointed district sales manager of American Radiator and Standard Sanitary Corporation in the southeastern area of the United States, Mr. Hairston is a veteran of World War I and a member of Georgia Engineering Society and various civic associations in Atlanta.

HEADQUARTERS of the Atlanta district office are located at 907 Chandler Building. The divisions of the company under his supervision include Troy Laundry Machinery, DeBothezat Fan, Tolhurst Centrifugal, and Riehle Testing Machine.

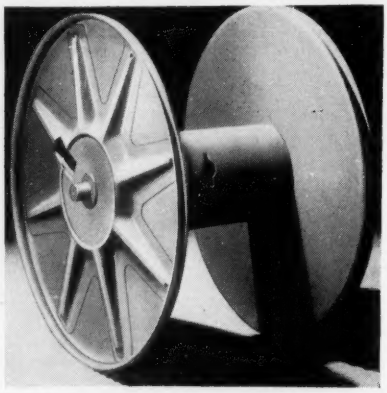
✦ ✦ ✦

Special Narrow Fabric Beam Gives Excellent Results

MANUFACTURERS of ribbon and other narrow fabrics are now offered a specially designed beam that has already given a good account of itself in this specialized field. These all-steel beams are electrowelded and of reinforced expertly engineered design.

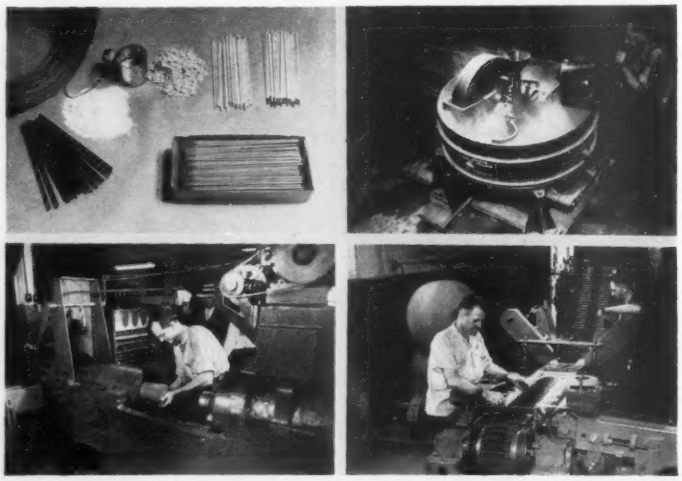
✦ ✦ ✦

HUBBARD narrow fabric beams are built to withstand the most severe mill operations. In actual practice, it was found that this beam effected important savings by reducing beam replacement materially. Its smooth surfaces and balanced construction also results in less waste of yarn.



FULL information on this product, as well as on warp beams, bobbins, loom beam heads, and jack, carder and twister spools may be obtained from the manufacturer, Hubbard Spool Company, 1624 Carroll Avenue, Chicago 12, Illinois. Hubbard's long experience with products for the textile field has been responsible for increasing efficiency and lowering cost of all types of yarn-handling.

WRITE FOR YOUR RESERVATION



TO

MOSLO'S WELDING ROD PLANT SHOW

ONCE AGAIN MOSLO OPENS FOR DEMONSTRATION A COMPLETE WELDING ROD PROCESSING PLANT—MANY NEW FEATURES HAVE BEEN ADDED TO THE MOSLO LINE. DON'T MISS THE MOSLO SHOW! OPEN SOON.

MOSLO GOES EVERY STEP OF THE WAY IN MANUFACTURING COMPLETE EQUIPMENT OF ELECTRODE PROCESSING PLANTS FOR LABORATORY OR PRODUCTION!

BY APPOINTMENT ONLY

MOSLO MACHINERY COMPANY

2439 PROSPECT AVENUE CLEVELAND, OHIO

History and Growth of the Tungsten Carbide Die

(Continued from Page 546)

Reasons for Carbide Adoption

THE principal reasons why the wire industry went through all this evolution and adopted carbide follows:

✦ ✦ ✦

FIRST: That as carbide was used more and more, it was found that wire could be held on closer tolerances. This had the effect of developing a wider field for the use of wire, and led also to closer specifications and tolerances. Previously wire had had as wide a range as .006". At the present time, even for ordinary applications, the range is within .002" while for special applications, .0001" is not unusual.

✦ ✦ ✦

SECOND, high production. When we think of the former small bundles of about 150 pounds that had to be handled manually, while at the present time with carbide we have the mechanical strippers and the welding of bundles weighing as high as 300 pounds in order to give continuous operation, we see what carbide has done for the wire industry in the way of high production.

✦ ✦ ✦

THIRD, better finish. It has been only a short time since we were in the era of the grease box that lubricated at every pass, and when all wire was drawn with a heavy sulcoat and a heavy lime coat. Now we have the straight line cleaning and flash bakers with practically no sulcoat, light lime, and, in some cases, bright drawing.

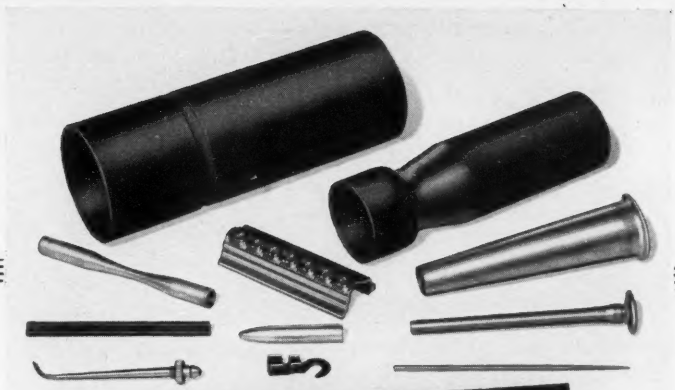
✦ ✦ ✦

FOURTH, elimination of scrap.

✦ ✦ ✦

FIFTH: many types of wire previously either very specialized and expensive, such as highly alloyed steel, intricate shapes, and bright finishes with high tensiles,

(Please turn to Page 570)



METALS FORMED BY "Standard" MACHINERY

Metal processing machinery offers economies in the shaping of many types of production items by forming with rolls and dies in place of cutting.

Savngs are effected through:

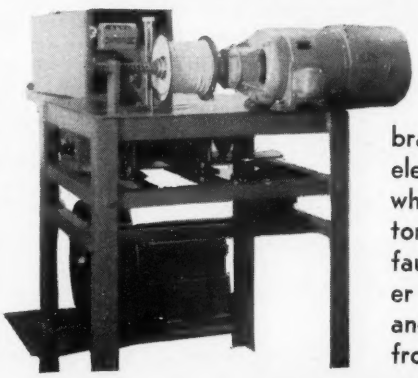
No waste in scrap, high production rates, semi-skilled operators, low maintenance costs of dies, rolls and machines. Processed materials have smooth surfaces and greater densities.

Recommendations furnished to accomplish your metal forming needs. Send prints or samples and state production volume requirements.

STANDARD MACHINERY CO., Providence 7, R. I.

SPARKER for SPOOLING SMALL WIRES

THIS APPARATUS WILL AUTOMATICALLY STOP WHEN DIELECTRIC FAULT OCCURS, or when the machine has wound a predetermined length of wire.



It is equipped with a gear head motor, electrical brakes on take-up and pay-off, electrode, control apparatus which automatically reduces the torque of the motor in starting, fault light indicator, transformer with tap switch, volt meter, and variac. Range of voltage from 1,000 to 16,000 volts.

Please Address Inquiries To:

R. L. DAVIS ELECTRIC CO., INC.

WALLINGFORD, CONN.

Highly Sensitive Third Pan On New Double Ratio Scale Simplifies Counting Small Parts

A NEW double ratio scale designated as Type 1133-C is offered by The Howe Scale Company of Rutland, Vt., which is especially adapted for counting small parts because of the high sensitivity provided by a third pan attached to the lower beam lever. Fully automatic, this scale is designed for the quick, accurate counting and weighing of materials in shipping, receiving and production departments as well as for inventory and similar counts of small parts.

✦ ✦ ✦

IN issuing 30,000 nuts from stock, for example, 300 nuts are required as counters on the ordinary double ratio counting scale. Instead of counting that number by hand, 30 can be placed in the 100:1 pan and nuts poured into the third pan until balance is obtained. The total in the third pan will be the required 300. These are transferred to the 100:1 pan with which a count of 30,000 can be made on the platform.

✦ ✦ ✦

THREE pan counting scales are obtainable from Howe in two regular ratio combinations. Other ratios are supplied on special order. Accessories for both magnifying and illuminating the reading point are available. A detailed description of these scales may be obtained by writing for Circular P-1.

✦ ✦ ✦

Army-Navy "E" Awarded Albert Wright, Oakland, Calif.

IN addition to being awarded the Army-Navy "E" some time ago for outstanding performance in production of war material, Albert Wright of Oakland, California has been awarded a "star" for the flag for continuance of this outstanding performance in continued production.

NILSON AUTOMATIC PRESS AND FOUR SLIDE MACHINE

FOR SWAGING, STAMPING, PIERCING, BLANKING, FORMING OF COILED METAL

WE also build machines for forming Paper Clips, Buckles, Gate Hooks, Coat and Hat Hooks, Ceiling Hooks, Wire Ears, Cable Rings, Screw Eyes, Sash Chains, Automobile Side Chains, Flat Open Link Chains, Staples, Cotter Pins, Hose Clamps, Etc., and Wire Straighteners, Wire Reels, Frame Bending Machines and Special Presses.

For Complete Details Address —

THE A. H. NILSON MACHINE CO.

BRIDGEPORT, CONN., U. S. A.

History and Growth of Tungsten Carbide Dies

(*Continued from Page 569*)

were made common practice on an economical basis.

✦ ✦ ✦

SIXTH: The need for high skill and long apprenticeship was almost entirely eliminated.

✦ ✦ ✦

SEVENTH: Wire drawing, previously a Guild art, was reduced to the plane of semi-skilled labor which expanded the field of suitable manpower.

✦ ✦ ✦

WE can easily trace the contributions of the carbide die to the wire industry; in fact, the modern wire mill had its first birthday with the introduction of the carbide die, and has been built around carbide.

✦ ✦ ✦

Growth is Mutual

AS we think of carbide dies today—with every wire mill completely equipped—it hardly seems possible that such a tremendous growth could have been realized in such a comparatively few years from such a modest start. The growth of sintered carbide, spectacular though it is, has been achieved only because of the hard work that attended the introduction of this material, because of progressive, engineering, and by the closest cooperation between various wire mills and die manufacturers. We have watched the demands grow from the time when most of these wire mills had only a few dies until they are all completely equipped.

✦ ✦ ✦

CARBIDE, in its turn, has left just as great an imprint on the wire industry where practically all of the great advances have been made since the introduction of the carbide die.

✦ ✦ ✦

WHEN carbide first made its appearance, practically all

the machines at that time were old, quick-starting frames or blocks. It is because of the advent of the carbide die that we see the universal adoption of the high-speed, continuous wire-drawing machines with their tremendous output per machine per man hour and all of their other, now well-known features, such as slow starting, water cooling, and many other modern advancements including mechanical strippers.

✦ ✦ ✦

Far-Reaching Effects

SUMMING it all up, we see where sintered carbide which started with a few dies in wire mills, has grown to the extent where many of the mills have tens of thousands of wire dies.

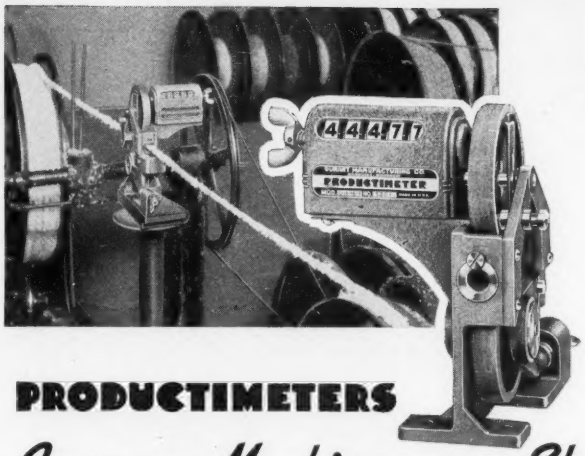
✦ ✦ ✦

IN addition, carbide has branched from there to cover such widely divergent fields as machining in general; the making of nails, springs, rolls, etc.; deep-drawing applications. Further, in this war, carbide has been of inestimable value to the Government because practically every artillery cartridge case has been drawn through carbide, as also have been most of the steel smallarms ammunition and much of the brass up to 50 caliber. Carbide has been such a tremendous factor in the production of war goods—even down to the precision bolts and rivets required by the airplane industry—that now production can be cut back.

✦ ✦ ✦

THESE different applications are only a few of the uses that we see in our kaleidoscope for carbide in the post-war reconversion era. With the thousands of new applications—from injection nozzles through to wear parts and other numerous applications where carbide will be utilized in the coming era — sintered carbide can be said conclusively to be a growth industry.

Make Your Plans Now
To Come To The 1944
Wire Association Convention
At The
William Penn Hotel
Pittsburgh, Pa.
October 16-19 Inclusive



POPULAR L-16 LINE
includes models with three types of reset: Wing-nut, Tumbler Lock and Quick Lever. L-H-16 operates up to 500 ft. per min. and L-HDW-16 up to 2000 ft. per min. L-R-16 is equipped with Predetermined Counter to provide a signal at the end of a pre-set number of feet.

PRODUCTIMETERS
Increase Machine Efficiency

Production and more production is demanded from every machine in the wire industry. But that is not enough . . . this production must be counted . . . measured . . . accurately . . . automatically . . . as an integral part of machine operation.

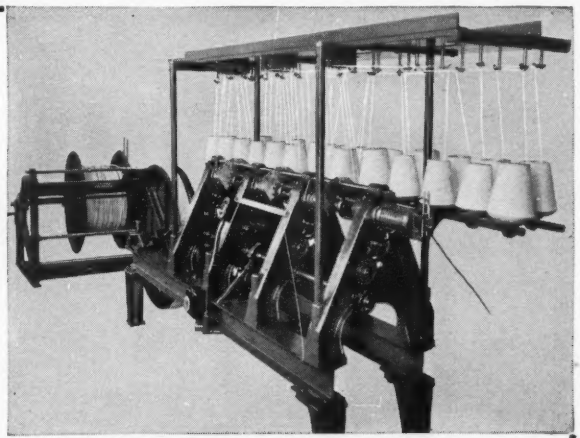
Productimeters give you this accurate count . . . the line includes units for every wire measuring requirement . . . for every type of material: Insulated Cable, Wire, Rope, Chain, Braid, Bare Copper Cable, rough-surfaced Conductor . . . greasy, oily wire . . . and they're rugged, built for day-in-day-out service.

If you have a wire measuring problem, write our Engineering Department for recommendations . . . they're backed by 64 years' experience in the exclusive manufacture of counting and measuring devices.

Bulletin No. 3 sent at your request

DURANT MANUFACTURING COMPANY
1918 N. Buffum St., Milwaukee 1, Wis. 176 Eddy St., Providence 3, R. I.

FIDELITY SINFRA MULTIPLE-HEAD HIGH-SPEED COVERING MACHINES
• • •

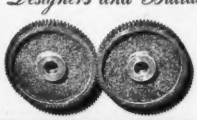


Knits two or three cotton coverings on bare wire up to #6 gauge—also flat or shaped, continuous-strip material, 1200 to 1500 feet per hour. Saves rubber since cotton coverings, impregnated, form excellent insulation. Straightening rollers operate horizontally and vertically. Each head knits one cover. 20″ or 36″ capstan take-off—separate haul-off reel stand, 40″ O.D., with traverse mechanism, 1000 lb. capacity.

Other advantages include: automatic electric stop motion on each yarn; improved knitting head and needle design; knits direct from large cones; quiet operation reduces operator fatigue.

Available in double- and triple-head types. Write for Bulletin.

Designers and Builders of Intricate, Automatic Precision Machines

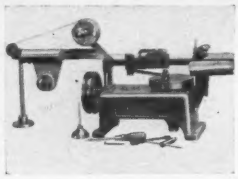


33 YEARS' EXPERIENCE
FIDELITY MACHINE COMPANY
3908-18 FRANKFORD AVENUE, PHILADELPHIA 24, PA.

WIRE CUTTING & SHAPING MACHINES

For Wire From .0005" to 1/16" and Flat Stock up to 1/8"

No. 111

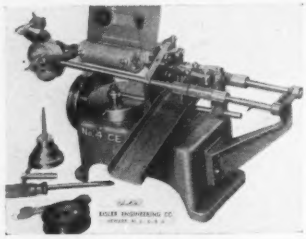


No. 4-E

Eisler fine wire cutting and forming machines have been in use over twenty-five years.

SEND US YOUR SAMPLES

No. 111-H



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FOR INFORMATION WRITE

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CHAS. EISLER

EISLER ENGINEERING CO.

747 South 13th St. (near Avon Ave.) Newark 3, N. J.

WIRE SHAPES

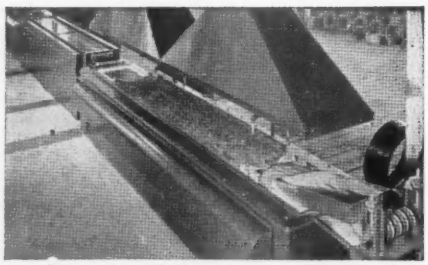
NEW — AND BETTER

PATENTING
TEMPERING
ANNEALING

The *Trauwood* PROCESS

OUTSTANDING ADVANTAGES

- Higher and more uniform physical and fatigue properties.
- No surface decarburization or scale.
- Faster wire speeds . . . greater production.
- Equipment fully automatic and easy to operate.
- Control of heating and cooling cycles extremely accurate.
- Thermal efficiency of the process very high.
- Much finer grained structure possible.
- High quenching temperatures rapidly attained.
- Adaptable to high alloy and austenitic steel wire and strip (annealing of stainless).



Trauwood Electric Wire Tempering and Patenting Unit

The Trauwood Process, new in principle, eliminates high temperature furnaces and lead pots with their excessive maintenance costs and low thermal efficiencies. More positive temperature control is possible and quenching is done in a RISING temperature—instead of falling, as in conventional heat treating methods. The rapid rate of heating (4 to 5 times as fast as furnace heating) increases production and uniformly produces a finer grained product with higher physical and fatigue values.

Wire and rod patented by the Trauwood Process insures easier drafting and makes heavier reductions possible. In conjunction with the Trauwood patenting equipment, pickling, coating and baking can be made continuous, eliminating expensive handling and delay, materially reducing costs as compared with ordinary methods.

Complete details of the Trauwood Process will be furnished you on request. Our engineers will help you solve your continuous wire and strip patenting, tempering, and annealing problems. Write today.

THE TRAUWOOD ENGINEERING COMPANY

1740 E. 23rd STREET, CLEVELAND, OHIO, U.S.A.

Sub-Sieve Diamond Powders For Die Work

(Continued from Page 549)

residue of a preliminary operation will always contain a quantity of smaller grains. Here is why: (Fig. 9).

✦ ✦ ✦

LET us assume that grains Nr2 take two hours to fall 32 inches and Nr 3 grains 4 hours etc. etc., and Nr7 grains 32 hours. After two hours all Nr2 grains will have reached the bottom. So will all Nr 3 grains which were in suspension below the 16 inch line. Even Nr 7 grains in suspension on the 2 inch line and below will have reached bottom as they travel at the rate of one inch per hour. We are now ready for the decantation of particles Nr2.

✦ ✦ ✦

AFTER draining the upper oil column into cylinder A_2 we stir the contents of the B vessel and repeat the operation in the first A cylinder filled with fresh oil.

✦ ✦ ✦

WE continue until our smallest particles are graded, each time, going through a preliminary operation before the final one.

✦ ✦ ✦

ONCE our grain sizes are set and checked on the microscope and the time for each operation determined, the entire operation becomes a matter of routine.

✦ ✦ ✦

Difficulties and How to Overcome Them. Practical Hints

AFTER powder Nr2 is obtained we will be left with double the amount of liquid so that the following preliminary operation will have to be made simultaneously in two A cylinders.

✦ ✦ ✦

AFTER N3 powder, we will have three times the liquid to contend with and so on.

IT is possible to avoid having to use simultaneously several cylinders for the preliminary operations by using cylinders of larger diameter. These can also be shortened so that the settling time will be correspondingly shortened.

✦ ✦ ✦

SEDIMENTATION should occur enclosed in a cabinet so that the temperature can be kept constant.

✦ ✦ ✦

IT is practical to choose a working temperature close to average room temperature in the summer.

✦ ✦ ✦

OPERATORS are cautioned against the effects of sunlight, light bulbs, breath and body heat, if operations are carried out in the open. Particularly when working on fine particles, the mere approach of the hand will set in motion currents which rise along the walls carrying with them particles and unsettling the result.

✦ ✦ ✦

THE amount of powder that can be graded at one time is determined by how much can be properly mixed in a C vessel and kept in a "loose" state.

✦ ✦ ✦

SOME of the freak results in the way of small particles finding their way to the bottom with the larger ones are unavoidable, but the quantities involved should be negligible. Here are some of the reasons and remedies.

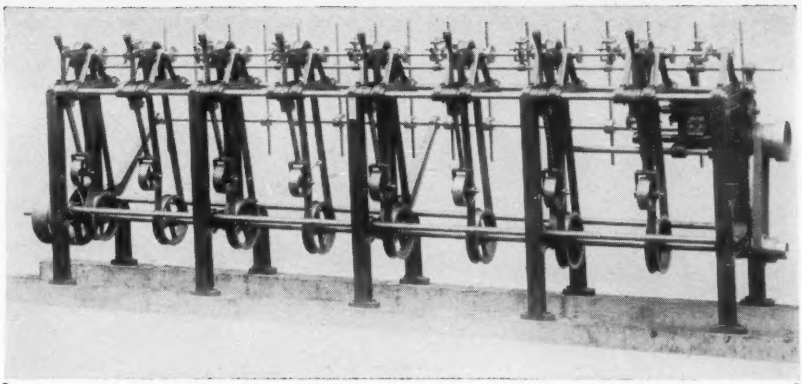
✦ ✦ ✦

1. **Two particles following each other too closely will fall twice as fast as an isolated one. These cases are greatly reduced in numbers when the oil column is high because it gives particles of unequal volume a chance to separate.**
2. **Particles stuck together will fall as if they formed one, thus faster than if they were isolated.**

✦ ✦ ✦

THIS can be minimized by stirring the powder in vessel C thoroughly. The trouble goes back

(Please turn to Page 574)



No. 1900E SPOOLER

WIRE SPOOLING MACHINES

Model illustrated takes spools up to 12″ diameter. Floor space required: 19″ x 10′; length can be varied to suit largest spool specified. Handles wire up to .050″ diameter. Other models made to suit specific requirements.

EMORY SPOOLERS are built for years of continuous service. Precision made, durable, rugged, dependable.

BUILDERS OF WIRE SPOOLING MACHINERY FOR A HALF CENTURY

For details, write to

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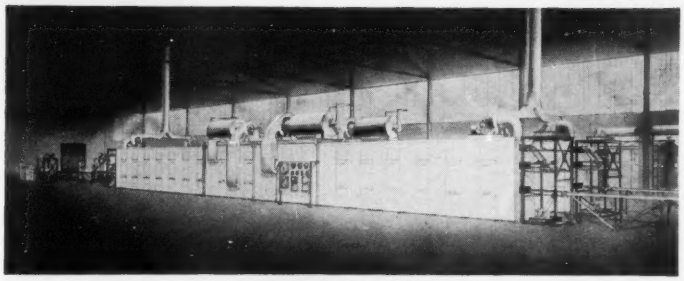
31 East Runyon Street
NEWARK 5, N. J.
Telephone: Bigelow 3-4415

MORE PRODUCTION IN LESS TIME *with* CARL-MAYER FURNACES, OVENS

CARL-MAYER HI-SPEED ROD BAKER

The fastest rod baker built! Saves up to 50% in time and fuel. Patented Blow-Off Feature removes moisture without bumping or agitating the coils. **Patented and patents pending.**



WELDING ROD OVEN

For drying coated welding rods. Uses the "Mayer" Recirculating Gas Fired Air Heater principle and Rod Transfer Systems (patents pending).

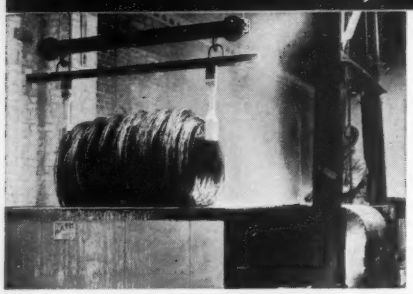
Growing interest in our type of equipment is evidenced by Carl-Mayer installations in such plants as:—

Atlantic Wire Co.
Atlas Steel Co.
Eaton Mfg. Co.
Hollup Corp.
Johnson & Nephew Ltd.
Page Steel & Wire Co.
Pittsburgh Tool Steel Wire Co.
Steel Co. of Canada
Wickwire Spencer Steel Co.

WRITE FOR BULLETIN #241

THE CARL-MAYER CORPORATION **3030 EUCLID AVENUE CLEVELAND, OHIO**

MORRISON FLASH BAKERS



Save Time

Cut Costs

Speed Production

Fifty-three Morrison Flash Bakers now in operation in 29 plants are proving to wire manufacturers that their cost is an investment that pays dividends because of these operational features—

1—Space saving—size of a lime tank
2—Fit straight line or circle setups
3—Reduce cleaning house fog
4—Rust-free rod
5—High capacity
6—Acid brittleness recovery of about 95%
7—Rod remains on hook
8—Only a few minutes required for baking even fine wire

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WILLEY'S DIES LAST MUCH LONGER

WIRE DRAWING, SIZING and EXTRUSION DIES

Manufactured in all sizes, to meet your requirements, from a specially developed grade of Tungsten Carbide having freedom from porosity, exceptional abrasion resistance and the ability to take a polish equal to that of diamonds. Furnished in four classifications, (1) blank and rough cored nibs, (2) rough cored dies, (cased), (3) semi-finished, rough drilled dies, (cased), (4) finished dies, ready to use.

WRITE FOR CATALOG

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

Sub-Sieve Diamond Powders for Die Work

(Continued from Page 573)

to the first mixing of the dry powder in oil. It is advisable to do the mixing the day before the operation raising the temperature of the oil and stirring at frequent intervals so that every particle will have its oil film.

✦ ✦ ✦

THE diameter of the cylinder A should not be smaller than at least 100 times the diameter of the largest particle and should be increased with the quantity of powder graded at one time.

✦ ✦ ✦

THE very finest powder will remain in suspension and may move erratically in all directions due to the Brownian movement. However in a liquid as viscous as olive oil at room temperature the effects are practically nil.

✦ ✦ ✦

AFTER we have taken out our smallest particles (presumably ½ or ¼ micron) those left will remain in suspension or work their way down over a period of weeks or months. When finally collected they have a resale value. If we wish to use the oil over again without waiting for them to settle we can do so as long as the density and viscosity are satisfactory.

✦ ✦ ✦

IT is inadvisable to report centrifugation at any time except when the oil is no longer expected to be used again.

THE WIRE ASSOCIATION
ANNUAL CONVENTION
will be held at the
WILLIAM PENN HOTEL
PITTSBURGH, PA.
October 16-19 Inclusive
For Detailed Information Address
RICHARD E. BROWN
Executive Secretary
THE WIRE ASSOCIATION
300 MAIN ST., STAMFORD, CONN.

Detection of Porosity in Plated Coatings

A NEW test paper for detecting porosity in plated coatings has been announced by the Hanson-VanWinkle-Munning Co., Matawan, N. J., called Fotopor Paper.

✦ ✦ ✦

FOTOPOR paper is most commonly used for determining the porosity of nickel deposited on iron and steel. However, it can also be used to test the porosity of chromium, copper, brass and tin over iron and steel; as well as these same metals over copper and brass. Blue spots will appear on the paper wherever iron or steel is exposed, and brown spots in the case of copper and brass.

✦ ✦ ✦

FOR some time, the supply of Fotopor paper has been limited, but it is now available in quantities which promise to be sufficient for all requirements. It is furnished in convenient rolls containing 150 lineal feet, 2″ wide, providing a total surface area of about 3600 sq. inches. The rolls are compact, about 4″ diameter; easy to handle; and packed in individual cardboard boxes.

✦ ✦ ✦

Fifth Army Communications in Italy

NEW records were set by communications men of the Army Signal Corps during the rapid advance of the Fifth Army in Italy, commencing with the great Allied offensive on Rome which was launched on the night of May 11, 1944. No extension of the Army wire system had been needed in the early part of that month, but from the moment of the breakthrough wire construction grew with phenomenal rapidity. Construction elements for six Signal battalions worked to extend the main Army open wire axis and by the end of May the pole line, carrying the open wire circuits, had reached a point near Terracina, 60 miles from the breakthrough point.

(*Please turn to Page 576*)

NORBIDE Abrasive

For Wire Drawing Dies

NORBIDE Abrasive successfully replaces expensive diamond powder in efficiently shaping, grinding and polishing wire drawing dies — particularly those made of the hard cemented carbides. NORBIDE is the registered trade mark for Norton Boron Carbide (B_4C) — the hardest material made by man.

NORTON COMPANY

Worcester 6, Massachusetts

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DRAW YOUR WIRE THE MODERN WAY with

GILRON COATING COMPOUNDS

A big step forward in wire drawing. Thoroughly proven in mill practice. Makes possible wire drawing speeds heretofore considered impracticable. Increases die life, prevents scratching of wire, produces better finish and eliminates use of lime in many cases.

These coating compounds are of particular value in the more difficult operations—stainless, alloy, high carbon and welding rod wire. Multiple reductions can be drawn without re-coating.

Coatings for Drawing Stainless, Alloy, Low and High Carbon and Copper Coated Wires

Let us confer with you. Write or telephone for particulars.

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FASTER PICKLING, UNIFORM RESULTS

With HEIL E-3 JETS!

The new HEIL E-3 steam jets for wire, strip, and continuous sheet provide complete agitation and uniform heating for the entire tank. Supplied in single units or in 10-foot flanged sections for *any* length tank. Made of heavy extruded lead alloys, with Nocorodal nozzle orifices, unattacked by most chemical solutions.

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Send today for this new steam jet bulletin.

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IMMEDIATE RECOGNITION!

ACCORDED THIS FOUR-STAR BOOK

★ Practical ★ Original ★ Interesting ★ Complete

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PRACTICAL METALLURGY

Applied Physical Metallurgy — Industrial Processing of Ferrous and Nonferrous Metals and Alloys

by

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In addition to 335 general illustrations, PRACTICAL METALLURGY contains 160 constitutional diagrams covering all systems that contain an important commercial alloy. These diagrams . . . the chapters on Plastic Deformation of Ferrous and Nonferrous Metals . . . and the chapter on Internal Stress in Metals contain information not available in any other book published in this country.

Here is the book you've long wanted — a simple yet complete treatise on practical metallurgy.

WIRE & WIRE PRODUCTS
300 Main St. Stamford, Conn.

Fifth Army Communications in Italy

(*Continued from Page 575*)

One construction company was sent to the Anzio beachhead and worked back along Highway 7 to meet the anticipated advance of the teams pushing north from Terracina.

✦ ✦ ✦

IN addition to the main axis construction, two open wire circuits were constructed to provide for the French Corps at Ausonia and two more for a lateral to the British Eighth Army. Work also was commenced on another lateral of two circuits to the Eighth Army.

✦ ✦ ✦

IN June Signal Corps units of the Fifth Army performed even greater feats, extending open wire circuits a distance of about 140 miles, which was without precedent in the Italian campaign. So rapid was the advance of the troops that all available construction personnel of four Signal Battalions, augmented by two construction companies, worked at top speed at the task of providing wire communication.

✦ ✦ ✦

ARMY depots issued, during the month of May, three times the amount of field and assault wire issued during the earlier static period; and in June they issued the impressive totals of 19,500 miles of field wire W-110, 5,000 miles of assault wire W-130 and 1,500 miles of Spiral 4.

✦ ✦ ✦

Farrel-Birmingham Awarded Maritime "M" and Victory Fleet Flag

THE United States Maritime Commission has announced the award of the Maritime "M" to the three plants of Farrel-Birmingham Company, Inc., at Ansonia and Derby, Conn., and Buffalo, N. Y. A telegram from Admiral H. L. Vickery of the Maritime Commission notified the company of the award, which is given in recognition of outstanding achievement in the Commission's shipbuilding program.

The

ANNUAL MEDAL AWARD

OF THE

WIRE ASSOCIATION

For the Most Meritorious Paper on Wire Manufacture or Fabrication During the Year

ALL members of the Wire Association are cordially invited to submit technical papers either for publication in "WIRE & WIRE PRODUCTS" during the year or for presentation before the Annual Wire Association Convention.

✦ ✦ ✦

AN annual medal will be awarded in each of the two major divisions of the activities of the Association, to the papers coming nearest to the requirement set forth above.

✦ ✦ ✦

CONSIDERATION for the Medal Awards is not limited to the papers presented at the Annual Meeting, but is given to all papers submitted by members and published in "WIRE & WIRE PRODUCTS" during the year.

✦ ✦ ✦

SELECTION of papers to be presented at the Annual Convention rests in the hands of the Joint Programme Committee and the Board of Directors of the Wire Association.

✦ ✦ ✦

ALL papers submitted become the property of the Wire Association and the Board of Directors constitutes the Committee on Awards.

✦ ✦ ✦

ADDITIONAL information may be obtained by addressing:

RICHARD E. BROWN,
SECRETARY,
THE WIRE ASSOCIATION
Stamford Trust Co. Bldg.,
STAMFORD, CONNECTICUT

How To Conserve Acid In Pickling

The more effective control you exercise over the amount of acid used in pickling operations, the better your chances of saving acid, conserving metal, eliminating over-pickling, reducing acid fumes, and inhibiting rust.

This FREE, 12-page manual will HELP YOU accomplish these objectives. It contains practical data on controlling both the amount of acid used and its action on metal. Like many other wire mill executives, you will find it a valuable handbook. Write for your FREE copy TODAY!

OAKITE PRODUCTS, INC.
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Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE MATERIALS...METHODS...SERVICE — Buy Bonds for Victory

Advertising and Taxes

"ANY business now making a taxable profit can buy expanded advertising at a heavy discount; in the case of firms in the excess profits bracket that discount is 85½%," points out The **Eddy - Rucker - Nickels Company**, Management and Advertising Counselors, Cambridge, Mass., in a recently published booklet, **"Strategic Advertising."**

✦ ✦ ✦

THIS opportunity, the authors remind business executives, could prevail for some years after the war if Congress follows the plan of Andrew Mellon after World War I and retains the excess profits tax in whole or part as an anti-inflation and Federal debt reduction measure. The booklet goes on to show that:

✦ ✦ ✦

"WHETHER current tax rates continue for one, two or more years, every business now has an unprecedented opportunity to buy low-cost 'life insurance' for brand names and trade-marks worth fortunes if kept alive in consumers' minds. This is the task for Strategic Advertising. The measure of its opportunity is that a firm may add $6,896.55 to its advertising for a net cost after Federal Taxes of $1,000, assuming absolutely no increase in sales and profits whatsoever as a result of the added Advertising."

✦ ✦ ✦

THE authors then show that firms able to increase production of consumer civilian goods are able to spend in advertising up to the entire gross margin on added sales, if necessary, without suffering any loss whatever. To utilize this opportunity in developing post-war demand to greatest advantage, this firm of Management Counselors feels that executives should know the rate of Asset Value to sales, the Break-even point of sales and the point of sales where Excess Profits taxes apply on earnings.

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ACID PROOF CONSTRUCTION

THE CEILCOTE CO.
Consulting and Research Engineers
750 ROCKEFELLER BLDG.
CLEVELAND, OHIO

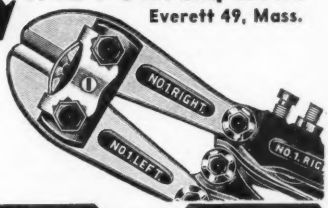
CUT HARD WIRE
The Easy Way --

including spring wire, wire fabrics, tie wire, etc., easily and quickly. Porter cutters save time and labor. Portable, hand-power — used anywhere in shop, factory, warehouse or out on a job.

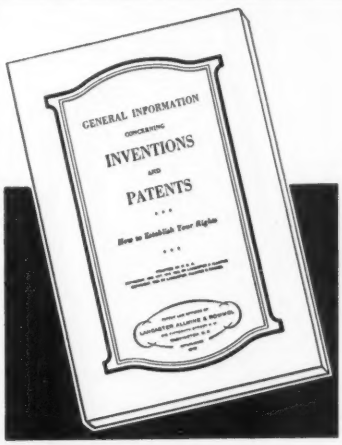
There is a standard Porter tool for every cutting job. Special heads designed to fit special needs including bending, crimping, etc. Write for catalog.

**(with center cut round edge jaws)*

H. K. PORTER, INC.
Everett 49, Mass.



PORTER HKP CUTTERS



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WIRE MEASURING MACHINE

FOR LINEAR MEASURE

PROVIDES NEW STANDARD OF ACCURACY

Illustration Shows Exclusive Patented "3V" Principle

Measuring twisted, armored, bare or insulated wire without vibration or inaccuracies at any speed or varying speeds!

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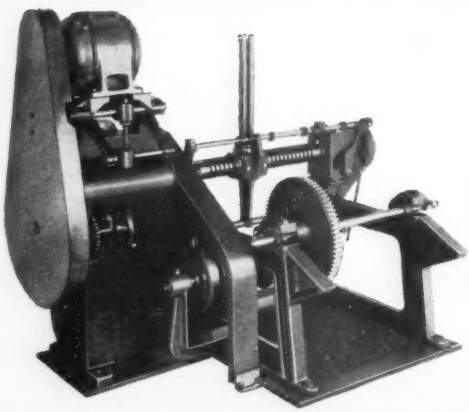

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NEBUTTCO

With variable speed transmission and adjustable automatic traverse motion.

Motor on hinged base with adjustment for tightening belt drive to speed transmission.

Built to suit customers' reels.

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NIAGARA Aero HEAT EXCHANGER

Saves cooling water cost, saves equipment, saves power. Controls temperature of Wire Drawing Compounds, Industrial Liquids, Quenching Baths, Jacket Water, Lubricating Oils.

Write for Bulletins 90 & 94

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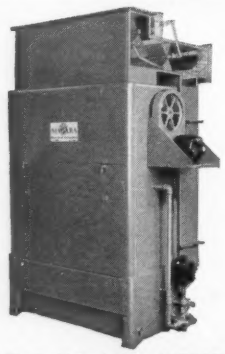
SALES ENGINEERS IN PRINCIPAL CITIES



U. S. Patent Nos. 2,296,946 and 2,321,933

Handbook On Fractional Horsepower V-Belt Drives

A NEW 44-page handbook on industrial fractional horsepower V-belt drives has just been published by The **B. F. Goodrich Company,** Akron, Ohio, and is now available upon request.

✦ ✦ ✦

THE booklet notes the trend toward larger sheaves in both fractional horsepower and multiple V-belt drives, describes the construction of B. F. Goodrich fractional horsepower V-belts and gives prices and data on both sheaves and belts.

✦ ✦ ✦

ONE of the most valuable portions of the handbook is the chapter on proper selection of FHP belt drives, with formulas, together with a page on how to get the most service from V-belt drives. Horsepower ratings and general engineering data of these drives are given, together with selection tables of stock drives using pressed steel and cast iron FHP single groove sheaves and adjustable cast iron single groove sheaves. Twenty-seven pages are devoted to these tables.

✦ ✦ ✦

Riehle New York Office Moves to Woolworth Building

THE New York district office of **Riehle Testing Machine Division, American Machine and Metals, Inc.,** formerly located at 100 Sixth Avenue, New York City, has been moved to the Woolworth Building, 233 Broadway, effective July 25, according to **A. Winkler Prins,** district manager. The company, whose plant is in East Moline, Illinois, states that rapid increases in its sales and office staffs, as well as enlarged service facilities, necessitates the move to the new address where increased space will meet the requirements of the various divisions of the company.

ARE YOU COMING TO THE WIRE ASSOCIATION CONVENTION IN OCTOBER?

Small Diamond Die Advisory Committee Meeting

(Continued from Page 553)

represented the office of Industry Advisory Committees, Fred G. Rockwell of the Miscellaneous Minerals Div., War Production Board who presided, with A. E. Leveridge, Chief, Diamond Die Section of the Miscellaneous Minerals Division, also in attendance. Representing Industry were the following:

Paul Bieberich,
Fort Wayne Wire Die Co.,
Fort Wayne, Ind.
Louis Chambre,
Balloffet Dies & Nozzle Co.,
Guttenberg, New Jersey.
Seth A. Combs,
Callite Tungsten Corp.,
Union City, New Jersey
Harry D. McKinney
Driver-Harris Company,
Harrison, New Jersey
F. Durand,
Cochaud Wire Die Corp.,
New York, New York.
Otis Ferrier,
Indiana Wire Die Co.,
Fort Wayne, Indiana.
Samuel Harris,
National Wire Die Co.,
New York, New York.
J. F. Kavanaugh,
C. O. Jelliff Mfg. Corp.,
Southport, Connecticut.

✦ ✦ ✦

Reduces Battery Consumption in Operation of Electric Trucks

IMPROVED economy in current consumption is the significant feature of the new M-79 Simplified Four-speed Reversing Controller for electric and gas-electric trucks manufactured by **The Elwell-Parker Electric Company,** Cleveland, Ohio. Experience in operation has shown that when motor current is restricted by introducing resistance on first, second and third speeds, a wasteful amount of current can be consumed by running the truck for protracted periods on any of these three speeds. The major portion of this possible waste of current is prevented by the M-79 Controller, which uses resistance on the first speed only.

The 1944 Convention
of the Wire Association
will be held at
PITTSBURGH, PA.
October 16-19 Inclusive

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Wire for a thousand uses

Versatile Continental wire is produced in sizes from 34 gauge to ⅝ inch, in standard and special shapes . . . and in a wide range of analyses, tempers and coatings.
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(The Superior Sheet Steel Co., Canton, Ohio — a subsidiary)

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CONTINENTAL SUPERIOR STEEL

CONTINENTAL
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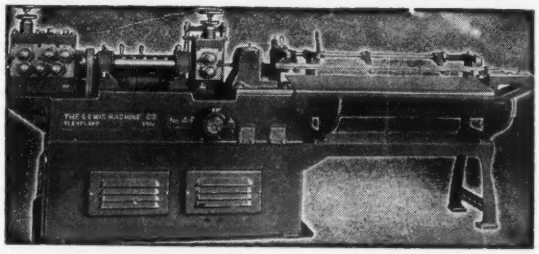

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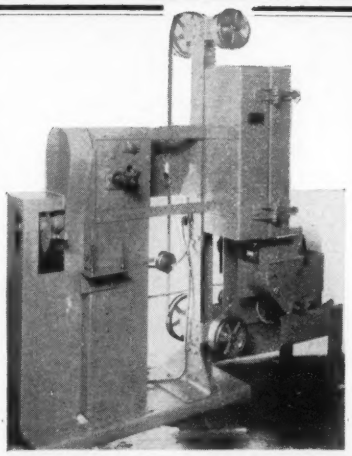

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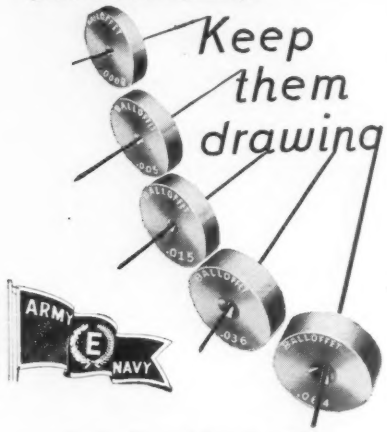

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Ten Recommendations for the Use of Diamond Drawing Dies

(Continued from Page 554)

ing two full sets of dies for each machine with adequate spares of all gauges. They withdraw a set of dies after a certain period, either calculated in poundage or running time, and replace it with the other set. This gives constant production and enables the set taken from use to be well washed and cleaned, preferably in some volatile spirit, and examined for cracks or uneven wear which may have slowly developed during the time the dies have been in operation. Any doubtful dies are put aside for reconditioning and replaced by the spares. The set is then ready for use again. Thus many dies are saved and returned to useful life, which would otherwise be overrun and fractured if given excessive running time.

✦ ✦ ✦

7 — Drawing Speed

SOFT wires can be drawn quicker than harder material. For finer wires a higher speed is usual. The drawing speed for diamond dies is practically the same as used for other die material.

✦ ✦ ✦

8 — Weight of Stone

THE weight of the raw stone is frequently chosen somewhat heavier than necessary in order to allow a long use of the die by frequent repolishing and eventual enlarging to the next size diameter. Experienced wire drawers argue that either the hole will be too long in the first place or, if proportionally correct, will become too short for the diameter of the bore when opened to larger size. Therefore, it is sometimes suggested for enlarging that the polishing should be preceded by a drilling operation to keep the shape of the duct in proper proportion. This method is not in general use, however. The weight of the raw stone is not such a reliable guide to quality as the mounting and particularly the shape and polish of the duct. Rein-

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forced mountings are sometimes used.

✦ ✦ ✦

9 — Diamond and Sintered Carbide Dies

IN a multiple machine only uniform stones should be used, either diamonds or hard metal dies, and never a mixture of both. The enlargement in the diameter of hard metal dies is very much greater (sometimes ratios 50 in 1 are quoted) in any length of wire than with a diamond die and consequently an unequal strain is thrown upon the diamond die immediately following a hard metal one, causing fracture and bad wire surface. Sometimes the first reduction ratio is made somewhat greater than the following ones, in modern wire drawing machines, however, the tendency seems to prevail to provide the same "draft" for all dies, irrespective of inlet or finishing size. An arrangement that will keep the wire taut and true before it enters the first die is of considerable advantage, because free running wire may cause failure of the first die.

✦ ✦ ✦

FOR copper wire 23 per cent, elongation (9.9 per cent diameter reduction) is a good value and used as standard draft in multiple machines. To arrange for different drafts on one machine requires very careful designing, otherwise there may occur excessive slip on one part of the machine, or, conversely, the drawing speed may be in excess of area reduction, and the wire would not draw at all on that section. The ideal would be to balance machine draft and die draft so that no slip and no strain would occur. Although this is not quite possible in practice, uniform and accurate drafting throughout is of considerable importance with

(Please turn to Page 582)

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Ten Recommendations for the Use of Diamond Drawing Dies

(Continued from Page 581)

regard to cone surface wear and wire quality.

\+ + +

10 — Handling Diamond Dies

THE diamond dies should be carefully handled in the shop and protected against shocks and blows. They must never be clamped in a vice or hammered. Careful application of load and careful release from it are essential. Continuous running of wire, i.e., connecting the coils by welding is preferred to running of short lengths of wire, resulting in frequent rethreading. The sudden release from tension when hard wire of large gauge is run right through a die may cause harm. The machine should be stopped and the wire pulled back by hand. Methodical treatment in the use and care of diamond dies is absolutely necessary if production of good quality wire is desired, and a record and history of each die, showing the user's factory number, maker or supplier, and maker's number, as well as date, etc., should be kept. The date of subsequent re-drillings or polishing should also be kept, and the date of eventual withdrawal from service, either for sale or breaking up for boart. These records enable one to compare dies of various makes and the slight trouble in keeping records is amply repaid.

\+ + +

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Standard Industrial Compounds Co., Chicago, Ill.

CONTROLS—Heat Treating
Niagara Blower Co., Buffalo, N. Y.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Everett, Mass.

DIAMONDS—Industrial
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Wks., New York, N. Y.

DIAMOND POWDERS—
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIE MAKING MACHINERY — For Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
United Die Co., Newark, N. J.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Lead Extrusion
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies Co., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.
Wopis Industry Laboratory, Brooklyn, N. Y.

DIRECT ELECTRIC RESISTANCE HEATING—
Trauwood Engr. Company, Cleveland, Ohio

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, O.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING AND PRE-HEATING ROOMS—
Industrial Oven Engr. Co., Cleveland, O.

DRYING EQUIPMENT—
W. S. Rockwell Co., New York, N. Y.
Ross, J. O., Engr. Corp., New York, N. Y.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Humidifying
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCES AND FENCING—Wire
Wickwire Spencer Steel Co., New York, N. Y.

FLASH BAKER—
Morrison Engr. Corp., Cleveland, Ohio

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Oven Engr. Co., Cleveland, O.

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Trauwood Engr. Company, Cleveland, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

WHERE TO BUY, Continued

FURNACES—Brazing
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Pennsylvania Industrial Engrs., Pittsburgh, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Electric
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engr. Co., Cleveland, Ohio

FURNACES—Hardening & Tempering
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Robertson, John, Co., Brooklyn, N. Y.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Pennsylvania Industrial Engrs., Pittsburgh, Pa.
Rockwell, W. S., Co., New York, N. Y.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING EQUIPMENT—
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

INSULATING MATERIALS — For Electric Wire & Cable
Carbide & Carbon Chemical Corp., Plastics Div., New York, N. Y.

INSULATION LACQUERING SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, O.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Morgan Construction Co., Worcester, Mass.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry & Machine Co., Waterbury, Conn.

LININGS—Acid and Alkali Proof
Ceilcote Co., The, Cleveland, Ohio
Heil Engineering Co., Cleveland, Ohio

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Syncro Machine Co., Rahway, N. J.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, Ohio
Eisler Engineering Co., Newark 3, N. J. (for Tungsten Wire)
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
American Insulating Machy. Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Machy. Co., Philadelphia, Pa.
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio
Eisler Engineering Co., Newark 3, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery Inc., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.

MACHINERY — Die Making for Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Draw Benches
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging
Broden Construction Co., Cleveland, Ohio.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark 3, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming
Eisler Engineering Co., Newark 3, N. J.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Galvanizing
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

WHERE TO BUY, Continued

MACHINERY — Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Brockton, Mass.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Broden Construction Co., Cleveland, Ohio.
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark 3, N. J.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa
Eisler Engineering Co., Newark 3, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up (Constant Tension, Variable Speed)
Industrial Oven Engr. Co., Cleveland, O.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark 3, N. J.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Eisler Engineering Co., Newark 3, N. J.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

NAILS—Wire
Youngstown Sheet & Tube Co., Youngstown, Ohio.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Shell Oil Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Cable Lacquering
Industrial Oven Engr. Co., Cleveland, Ohio
W. S. Rockwell Co., New York, N. Y.

OVENS—Dehydrogenizing
Industrial Oven Engr. Co., Cleveland, O.
W. S. Rockwell Co., New York, N. Y.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Oven Engr. Co., Cleveland, Ohio
Morrison Engr. Corp., Cleveland, Ohio
W. S. Rockwell Co., New York, N. Y.
Ross, J. O., Engineering Corp., New York, N. Y.

OVENS—Welding Rod Coating
Industrial Oven Engr. Co., Cleveland, O.
W. S. Rockwell Co., New York, N. Y.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PICKLING TANK LININGS—
Ceilcote Co., The, Cleveland, O.
Heil Engineering Co., Cleveland, Ohio
Keagler Brick Co., Steubenville, Ohio.
Sauereisen Cement Co., Pittsburgh, Pa.

PIPES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lacquer
Industrial Oven Engr. Co., Cleveland, O.

POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

WHERE TO BUY, Continued

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

QUENCHING BATH CONTROL—
Niagara Blower Co., Buffalo, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B. Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B. Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B. Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio
Morrison Engr. Corp., Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

ROLL STRAIGHTENERS—
Moslo Machinery Co., Cleveland, Ohio

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Brewer Mfg. Co., Muncy, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

SATURATION SYSTEMS—
Industrial Oven Engr. Co., Cleveland, O.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Oven Engr. Co., Cleveland, O.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPRINGS—Steel
Wickwire Spencer Steel Co., New York, N. Y.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRAND—Steel and Copper
Brewer Mfg. Co., Muncy, Pa.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANK LININGS—Brick
Ceilcote Co., The, Cleveland, O.
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Corp., Buffalo, N. Y.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Nukem Products Corp., Buffalo, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TEMPERATURE CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Scott, Henry L., Co., Providence, R. I.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio

WIND-UP AND UNWIND SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, O.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled for Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Flat
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Galvanized
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Franklin Steel & Wire Co., Brooklyn, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Music
Jersey Steel & Wire Corp., Irvington, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.

WIRE—Non-Ferrous to Specification for Special Purposes
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE—Stainless Steel
Firth-Sterling Steel Co., McKeesport, Pa.
Franklin Steel & Wire Co., Brooklyn, N. Y.
Jersey Steel & Wire Corp., Irvington 11, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Franklin Steel & Wire Co., Brooklyn, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

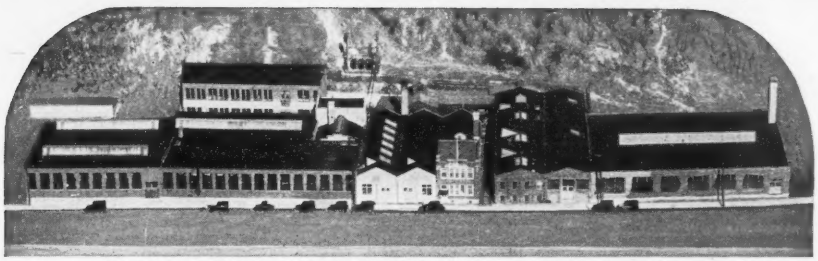
WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.

YARNS—Insulating
Cheney Bros., New York, N. Y.



HUDSON WIRE CO. PLANT AT OSSINING, N. Y.

This plant is one of the most up-to-date and completely equipped plants in the world for the production of "HUDCO" fine wires in all metals.

ESTABLISHED IN 1902

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity, Electric Wire. Cadmium, Nickel Silver, Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze, Brush Wires, Crimp and Straight, Brass, Steel, Nickel Silver, Copper and Phosphor Bronze.

FINE BARE WIRES

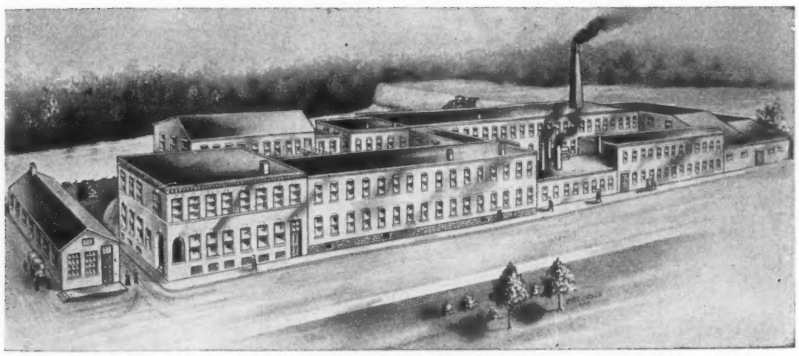
High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper. Cadmium, Nickel Silver, Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification, Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from Selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing.

BETTER WIRE AT LOWER COST

Send Us Your Specifications and Let Us Quote Prices

HUDSON WIRE COMPANY • OSSINING, N. Y.



Winsted Division of HUDSON WIRE CO. at Winsted, Conn., modern and completely equipped enamelled wire plant for LEAKPROOF ENAMELLED WIRE and all standard and special coverings.

"WINCO" enamelled wire is drawn from special selected copper, assuring perfect enamelling. All wire tested before shipment.

"WINCO" enamelled wire is available in all standard and special coverings made to meet exacting requirements.

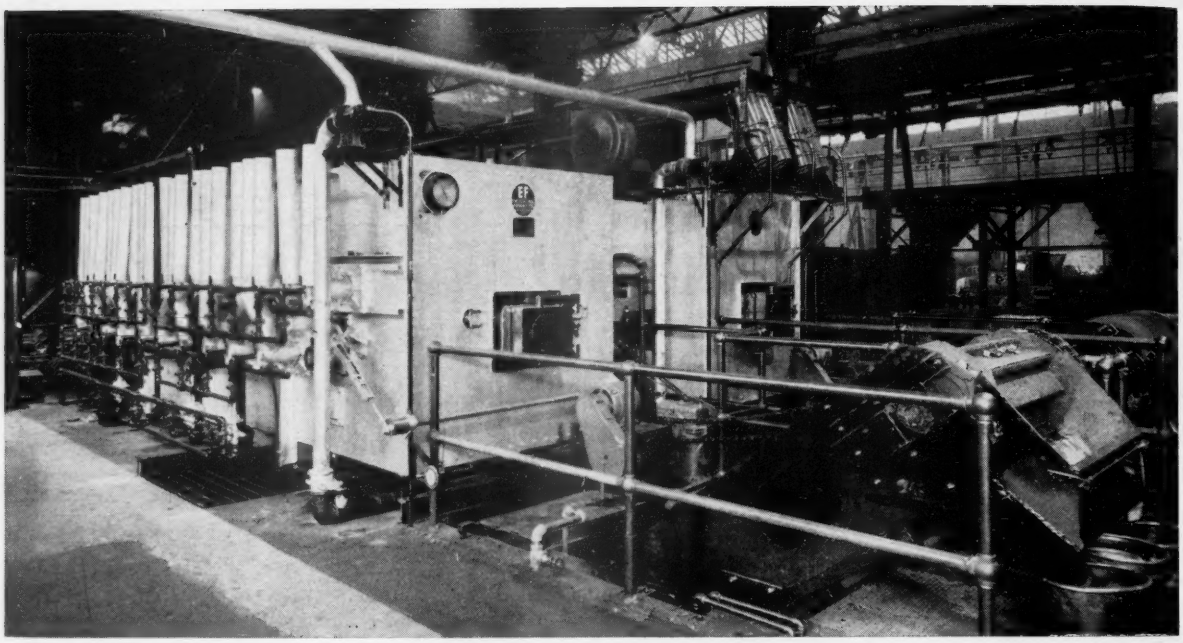
Samples of LEAKPROOF and other enamelled wires sent on request

WINSTED DIVISION OF HUDSON WIRE COMPANY

WINSTED, CONN.

EF FURNACES

For Every Industrial Heat Treating Process



EF Gas Fired Radiant Tube Chain Belt Conveyor Furnaces

For Scale-Free Hardening Miscellaneous Products 175 to 2000 lbs. per hour—continuously

Products Being Treated in EF Chain Belt Furnaces include:

- Sprockets
- Cap screws
- Bolts and nuts
- Gears and pinions
- Flat springs
- Coil springs
- Small forgings
- Valve springs
- Spring plates
- Tractor links
- Rivets and washers
- Wrench & tool parts
- Bearing parts—cups and cones
- Machine gun cartridge clips
- Aircraft engine parts
- Automotive parts
- Rock bits, and many other products

The above gas fired radiant tube furnace is one of three continuous chain belt conveyor type furnaces we installed in one prominent midwestern plant for scale-free hardening their small and medium size parts and products.

EF continuous chain belt conveyor furnaces may be oil fired, gas fired, or electrically heated. They are built in five standard sizes with capacities ranging from 175 to 2000 lbs. per hour. Larger or smaller sizes can also be furnished. Any size or type can be built for using special protective atmospheres for heat treating without scale or decarburization.

They are handling all kinds of parts and products ranging in size from small bolts and springs up to large crawler links for tanks and tractors. Hundreds of installations are in operation handling such products as listed at left.

The chain belt conveyor type furnace is one of the most satisfactory and dependable general purpose heat treating machines built for the continuous, uniform, economical, production heat treatment of miscellaneous small and medium sized parts and products.

This is only one of the numerous types we build. Wire, tubing, strip, castings, forgings, stampings, aircraft and aircraft engine parts, tank and truck parts, and many other products are being uniformly treated in other types of production furnaces we have built.

Telephone 4661 Salem, Ohio, or write us regarding your furnace problems. We specialize on building production furnaces—oil fired, gas fired, or electrically heated.

Send for circulars showing the chain belt and other types of EF production furnaces

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces—For Any Process, Product or Production

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